THE TOOL ENGINEER

OFFICIAL PUBLICATION OF THE ASTE AMERICAN SOCIETY OF TOOL ENGINEERS

Behind every product that is mass produced is the tool engineer

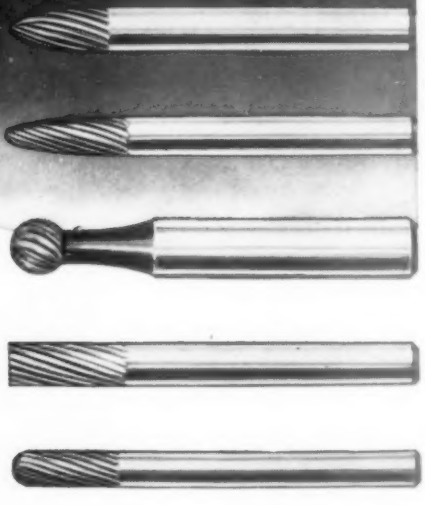
New

A Get-Acquainted Kit of Master-Ground Carbide Burs

Here's a neatly packaged kit of P&W Master-Ground Carbide Burs that will earn its keep in almost any shop. And in your shop, it will demonstrate many important ways to cut costs and save time. Here's why:

1. They're uniform. Every one is the identical twin of every other of a designated shape. All teeth share equally in the cutting so they wear uniformly, maintaining their shape.
2. They outlast ordinary high-speed steel burs up to 75 times before re-sharpening. Then, they may be re-sharpened many times at Pratt & Whitney.
3. They'll do many jobs that ordinary burs can't . . . such as altering dies or molds *after* hardening . . . even to 65 Rockwell C.

Get acquainted with P&W Carbide Burs. Place your order for this valuable set, today.



PRATT & WHITNEY

WEST HARTFORD 1, CONN.

PUBLISHED MONTHLY BY

THE TOOL ENGINEER

AMERICAN SOCIETY OF TOOL ENGINEERS

Volume XVIII **June, 1947** **Number 5**

Editorial

Robert B. Powers . . . . . *Executive Editor*
A. E. Rylander . . . . . *Technical Editor*
Doris B. Pratt . . . . *A.S.T.E. News Editor*
Nik Varkula . . . . . *Technical Art Director*

Advertising

Clarence T. Etter . . . . . *Advertising Mgr.*
B. B. Wellman . . . *Assistant Advertising Mgr.*

Editorial Committee

W. B. McClellan . . . . . *Chairman*
K. C. Jasper . . . . . *Vice-Chairman*
Foster C. Koehn . . . . . *Secretary*
John A. Lapham — Michael J. Radecki
H. L. Tigges — Anton Peck

Officers

W. B. Peirce . . . . . *President*
I. F. Holland . . . . . *First Vice-President*
R. B. Douglas . . . . . *Second Vice-President*
George C. Johnson . . . *Third Vice-President*
W. A. Dawson . . . . . *Secretary*
V. H. Ericson . . . . . *Treasurer*
H. E. Conrad . . . . . *Executive Secretary*

Board of Directors

W. B. Peirce, *Chairman*

C. B. Cole — I. F. Holland
H. E. Collins — T. P. Orchard
A. J. Denis — A. M. Sargent
R. B. Douglas — A. M. Schmit

G. S. Wilcox, Jr.

TABLE OF CONTENTS

PAGE

EDITORIAL—THERE'S GOLD IN HUMAN ENGINEERING . . . . . *by W. B. Peirce* 17

SCREENING VS. SAMPLING IN INSPECTION . . . . . *by Philip G. Fishback* 18

PRODUCTION OF SWING SPOUT FAUCETS . . . *by Fred Burt* 24

FORMAL EDUCATION FOR TOOL ENGINEERS . . . . . *by Walter J. Brooking* 30

DRAWING DIE PROBLEMS AND FORMULAE . *by James Walker* 35
PART THREE OF A SERIES

ALUMINUM GLAMORIZED BY COLOR . . . *by Phil Glanzer* 39

INDENTATION METHOD FOR MEASURING WEAR . . . . . *by U. S. Bureau of Standards* 41

VERSATILE NEW PRESS SPEEDS DIE TRYOUT . *by Gunnar Skog* 44

DEPARTMENTS

FUNDAMENTALS OF TOOL ENGINEERING 45
GADGETS 47
ANDYGRAMS 48
A.S.T.E. NEWS 49
BULLETINS 61
TOOLS OF TODAY 62-70
NORTH, EAST, WEST, SOUTH IN INDUSTRY 68
INDEX TO ADVERTISERS 134

American Society of Tool Engineers

National Headquarters

Phone: CHerry 8082
1666 Penobscot Bldg. Detroit 26, Michigan

The TOOL ENGINEER
Editorial and Advertising Offices:
Phone: TEmple 2-2560
1922 West Canfield Detroit 8, Michigan

The Tool Engineer is published monthly at 1666 Penobscot Building, Detroit 26, Michigan, in the interest of the members of the American Society of Tool Engineers. Advertising and Editorial departments are located at 1922 West Canfield, Detroit 8, Michigan. Subscription is $2.00 per year. Non-members $6.00 per year in the U.S.A., Canada $6.50 per year; all other foreign countries, $8.00 per year. Copyright 1947 by the American Society of Tool Engineers. Entered as second-class matter February 8, 1945, at the post office at Detroit, Michigan, under the Act of March, 1879.

Directory of A.S.T.E. Chapter Chairmen

AKRON CHAPTER, NO. 47
Second Thursday *
Herman A. Guy, *Chairman*
R. D. No. 1, Alliance, Ohio

ATLANTA CHAPTER, NO. 61
Third Monday *
Dwight L. Hollowell, *Chairman*
3174 Peachtree Dr., N. E.,
Atlanta 5, Ga.

BALTIMORE CHAPTER, NO. 13
First Wednesday *
Thomas F. Burke, *Chairman*
2802 Kennedy Ave.,
Baltimore 18, Md.

BINGHAMTON CHAPTER, NO. 35
1st Wed. after 1st Mon.*
Roland B. Andrews, *Chairman*
461 Vestal Road, R. D. 2,
Binghamton, N. Y.

BOSTON CHAPTER, NO. 33
Second Tuesday *
John Ryneska, *Chairman*
Western Ave. 69-A,
E. Lynn, Mass.

BUFFALO-NIAGARA FRONTIER CHAPTER, NO. 10
Second Wednesday *
Albert Kirchgessner, *Chairman*
127 Columbia Drive,
Williamsville, N. Y.

CEDAR RAPIDS CHAPTER, NO. 71
Third Wednesday *
Robert A. Hruska, *Chairman*
2011 D Ave., N. E.,
Cedar Rapids, Iowa

CENTRAL PENNSYLVANIA CHAPTER, NO. 22
Second Tuesday *
Paul P. Stock, *Chairman*
460 Edgehill Rd., York, Penn.

CHICAGO CHAPTER, NO. 5
First Monday *
Fred J. Schmitt, *Chairman*
D. A. Stuart Oil Co.,
2727 So. Troy St.,
Chicago 23, Ill.

CINCINNATI CHAPTER, NO. 21
Second Tuesday *
George R. Squibb, *Chairman*
R.R. No. 1, Box 143-K,
Cincinnati 27, Ohio

CLEVELAND CHAPTER, NO. 3
Second Friday *
Edgar W. Baumgardner, *Chairm'n*
Industrial Ovens, Inc.,
13825 Triskett Road,
Cleveland 11, Ohio

COLUMBUS CHAPTER, NO. 36
Second Wednesday *
Walter E. L. Bock, *Chairman*
323 Southwood Ave.,
Columbus, Ohio

DAYTON CHAPTER, NO. 18
Second Monday *
Edgar J. Seifreat, *Chairman*
Seifreat Elstad Mach. Co.,
P.O. Box 332, Dayton 1, Ohio

DECATUR CHAPTER, NO. 58
Second Monday *
Ray W. Howell, *Chairman*
1476 W. Decatur, Decatur, Ill.

DETROIT CHAPTER, NO. 1
Second Thursday *
Leslie B. Bellamy, *Chairman*
Sterling Grinding Wheel Co.,
220 E. Milwaukee Ave.,
Detroit 2, Mich.

ELMIRA CHAPTER, NO. 24
First Monday *
Edward Stachel, *Chairman*
927 Spruce St., Elmira, N. Y.

ERIE CHAPTER, NO. 62
First Tuesday *
Mathew H. Hetzel, *Chairman*
1140 West 31st St., Erie, Pa.

EVANSVILLE CHAPTER, NO. 73
Second Monday *
Frank J. Hausfeld, Jr., *Chairman*
R.R. No. 5, Box 30,
Evansville, Ind.

FAIRFIELD COUNTY CHAPTER, NO. 6
First Wednesday *
Arthur R. Hunt, *Chairman*
64 Avon St., Devon 2, Conn.

FLINT CHAPTER, NO. 68
Third Thursday *
Norman F. Snyder, *Chairman*
2006 Mt. Elliott, Flint 4, Mich.

FOND DU LAC CHAPTER, NO. 45
Second Friday *
William E. Rutz, *Chairman*
142 Dott St., Fond du Lac, Wis.

FORT WAYNE CHAPTER, NO. 56
Second Wednesday *
Emil W. Mellin, *Chairman*
914 W. Sherwood Terrace,
Fort Wayne 6, Ind.

FOX RIVER VALLEY, NO. 72
First Tuesday *
Roy G. Frogness, *Chairman*
Box 304, Rt. 3, Aurora, Ill.

GOLDEN GATE CHAPTER, NO. 28
Third Wednesday *
Floyd V. Snodgrass, *Chairman*
2601 Maxwell Ave.,
Oakland 2, Calif.

HAMILTON CHAPTER, NO. 42
Second Friday *
William A. Alexander, *Chairman*
88 Prospect St. S.,
Hamilton, Ont.

HARTFORD CHAPTER, NO. 7
First Monday *
Richard A. Smith, *Chairman*
328 Harvard St.,
Hartford 6, Conn.

HOUSTON CHAPTER, NO. 29
Second Tuesday *
Homer Briggs, *Chairman*
6514 Pinehurst,
Houston 3, Texas

INDIANAPOLIS CHAPTER, NO. 37
First Thursday *
John Horton, *Chairman*
816 N. Audubon Road,
Indianapolis 1, Ind.

KANSAS CITY CHAPTER, NO. 57
First Wednesday *
Leroy E. Campbell, *Chairman*
5912 College Ave.,
Kansas City 4, Mo.

LITTLE RHODY CHAPTER, NO. 53
Third Wednesday *
Wilfred J. Pender, *Chairman*
43 Seba Kent Road,
Pawtucket, R. I.

LOS ANGELES CHAPTER, NO. 27
Second Thursday *
Leslie F. Hawes, *Chairman*
1421 N. Edgemont,
Los Angeles 27, Calif.

LOUISVILLE CHAPTER, NO. 54
Second Tuesday *
John E. Paskey, *Chairman*
2322 Greenwood Ave.,
Louisville 11, Ky.

MADISON CHAPTER, NO. 75
1st Tues. after 1st Mon.*
Fred H. Kessenich, *Chairman*
308 E. Wilson St.,
Madison 3, Wis.

MID-HUDSON CHAPTER, NO. 74
First Wednesday *
John L. Petz, *Chairman*
Pendell Road,
Poughkeepsie, N. Y.

MILWAUKEE CHAPTER, NO. 4
Second Thursday *
Paul E. Butzin, *Chairman*
8104 Richmond Court,
Wauwatosa 13, Wis.

MONTREAL CHAPTER, NO. 50
Second Wednesday *
Henry T. Welch, *Chairman*
732 Victoria Ave.,
St. Lambert, Que.

MUNCIE CHAPTER, NO. 70
Second Wednesday *
Robert L. Waters, *Chairman*
806 Weber Drive, Muncie, Ind.

NASHVILLE CHAPTER, NO. 43
Third Friday *
Guy Hamilton, *Chairman*
Manufacturers Agent
518 3rd Nat'l Bank Bldg.,
Nashville 3, Tenn.

NEW HAVEN CHAPTER, NO. 41
Second Thursday *
Ray E. Gifford, *Chairman*
96 Kimberly Ave.,
East Haven 12, Conn.

NEW ORLEANS CHAPTER, NO. 60
Second Wednesday *
Carl Hazlewood, *Chairman*
6574 General Haig
New Orleans 19, La.

NEW YORK, GREATER, CHAPTER, NO. 34
First Monday *
Harmon S. Hunt, *Chairman*
325 Cherry St.,
Douglaston Manor, L. I., N.Y.

NIAGARA DISTRICT CHAPTER, NO. 65
Second Friday *
William L. Sandham, *Chairman*
94 Duncop Drive,
St. Catharines, Ont.

NORTH TEXAS CHAPTER, NO. 51
2nd Fri. (Tentative) *
Theodore A. Hersh, *Chairman*
2901 Westridge Ave.,
Ft. Worth 7, Texas

NORTHERN NEW JERSEY CHAPTER, NO. 14
Second Tuesday *
Edward T. Ross, *Chairman*
223 Bellevue Ave.,
Upper Montclair, N. J.

PEORIA CHAPTER, NO. 31
First Tuesday *
R. C. Kolb, *Chairman*
98 N. Maplewood Ave.,
Peoria 5, Ill.

PHILADELPHIA CHAPTER, NO. 15
Third Thursday *
Arthur R. Diamond, *Chairman*
Greene Manor,
Johnson and Greene Sts.,
Philadelphia 44, Pa.

PHOENIX CHAPTER, NO. 67
Third Wednesday *
Harry E. Rives, *Chairman*
Rt. No. 1, Box 43-D,
Tempe, Arizona

PITTSBURGH CHAPTER, NO. 8
First Friday *
Paul H. Magnus, *Chairman*
Tranter Mfg. Co.,
105 Water St.,
Pittsburgh 22, Pa.

PONTIAC CHAPTER, NO. 69
Third Thursday *
Albert J. Rhodes, *Chairman*
1245 Rhodes Rd.,
Lake Orion, Mich.

PORTLAND (MAINE) CHAPTER, NO. 46
Fourth Friday *
Carl L. Bohlin, *Chairman*
28 Hall Ave., Saco, Maine

PORTLAND (OREGON) CHAPTER, NO. 63
Third Thursday *
William E. Brennan, *Chairman*
3036 S.E. 33rd Ave.,
Portland 2, Ore.

POTOMAC CHAPTER, NO. 48
First Thursday *
Richard P. Thayer, *Chairman*
4704 Butterworth Pl., N.W.,
Washington 16, D. C.

RACINE CHAPTER, NO. 2
First Monday *
William P. Clark, *Chairman*
2105 Washington Ave.,
Racine, Wis.

RICHMOND CHAPTER, NO. 66
Second Tuesday *
Lowell B. Penland, *Chairman*
2509 E. Main St.,
Richmond, Ind.

ROCHESTER CHAPTER, NO. 16
First Monday *
Milton L. Roessel, *Chairman*
97 Biltmore Drive,
Rochester 12, N. Y.

ROCKFORD CHAPTER, NO. 12
First Thursday *
Earnest Y. Seborg, *Chairman*
1523 Huffman Blvd.,
Rockford, Ill.

ST. LOUIS CHAPTER, NO. 17
First Thursday *
Edward H. Ruder, *Chairman*
57 Hanley Downs,
Richmond Heights 17, Mo.

SAN DIEGO CHAPTER, NO. 44
Second Tuesday *
Raymond W. Peters, *Chairman*
2442 Comstock Drive
San Diego 11, Calif.

SCHENECTADY CHAPTER, NO. 20
Second Thursday *
John Stedman, *Chairman*
54 Broderick St.
Albany 5, N. Y.

SEATTLE CHAPTER, NO. 39
Second Tuesday *
Gordon Munro, *Chairman*
Rt. 4, Box 2432
Bremerton, Wash.

SOUTH BEND CHAPTER, NO. 30
Second Tuesday *
Edgar W. Helm, *Chairman*
1152 E. Victoria St.,
South Bend 14, Ind.

SPRINGFIELD (ILLINOIS) CHAPTER, NO. 64
First Tuesday *
Henry G. Becker, *Chairman*
830 No. 5th St.,
Springfield, Ill.

SPRINGFIELD (MASS.) CHAPTER, NO. 32
Second Monday *
Alexander W. Todd, *Chairman*
50 Johnson St.,
Springfield 8, Mass.

SPRINGFIELD (OHIO) CHAPTER, NO. 76
Second Thursday *
James B. Douglas, *Chairman*
609 E. McCreight,
Springfield, Ohio

SYRACUSE CHAPTER, NO. 19
1st Thurs. after 2nd Mon.*
Hugo C. Klix, *Chairman*
425 Glenwood Ave.,
Syracuse 7, N. Y.

TOLEDO CHAPTER, NO. 9
Second Wednesday *
Albert Hage, *Chairman*
3700 Roanoke Rd.,
Toledo 12, Ohio

TORONTO CHAPTER, NO. 26
Second Monday *
L. M. Jardine, *Chairman*
6 Pepler Ave., Toronto, Ont.

TRI CITIES CHAPTER, NO. 23
Third Monday *
Lennart N. Dahlen, *Chairman*
901 43rd St.
Rock Island, Ill.

TWIN CITIES CHAPTER, NO. 11
First Wednesday *
Clifford V. Lofdahl, *Chairman*
5933 Elliott Ave. S.,
Minneapolis 7, Minn.

TWIN STATES CHAPTER, NO. 40
Second Wednesday *
Alan E. Stubbs, *Chairman*
Highland Rd., Springfield, Vt.

WESTERN MICHIGAN CHAPTER, NO. 38
Second Monday *
Peter C. Maghielse, *Chairman*
2434 Miller Ave., N. W.,
Grand Rapids 4, Mich.

WICHITA CHAPTER, NO. 52
Second Wednesday *
Harold J. Bales, *Chairman*
1702 N. Lorraine Ave.,
Wichita 6, Kan.

WILLIAMSPORT CHAPTER, NO. 49
Second Monday *
Lewis H. Bardo, *Chairman*
2347 Hillside Ave.,
Williamsport, Penn.

WINDSOR CHAPTER, NO. 55
Second Monday *
R. T. Richards, *Chairman*
R.R. No. 1, Windsor, Ont.

WORCESTER CHAPTER, NO. 25
First Tuesday *
Charles W. Monigle, *Chairman*
364 Greenwood St., R.F.D. 2,
Millbury, Mass.

* CHAPTER MEETING NIGHT

HARDINGE
ELMIRA, N.Y.

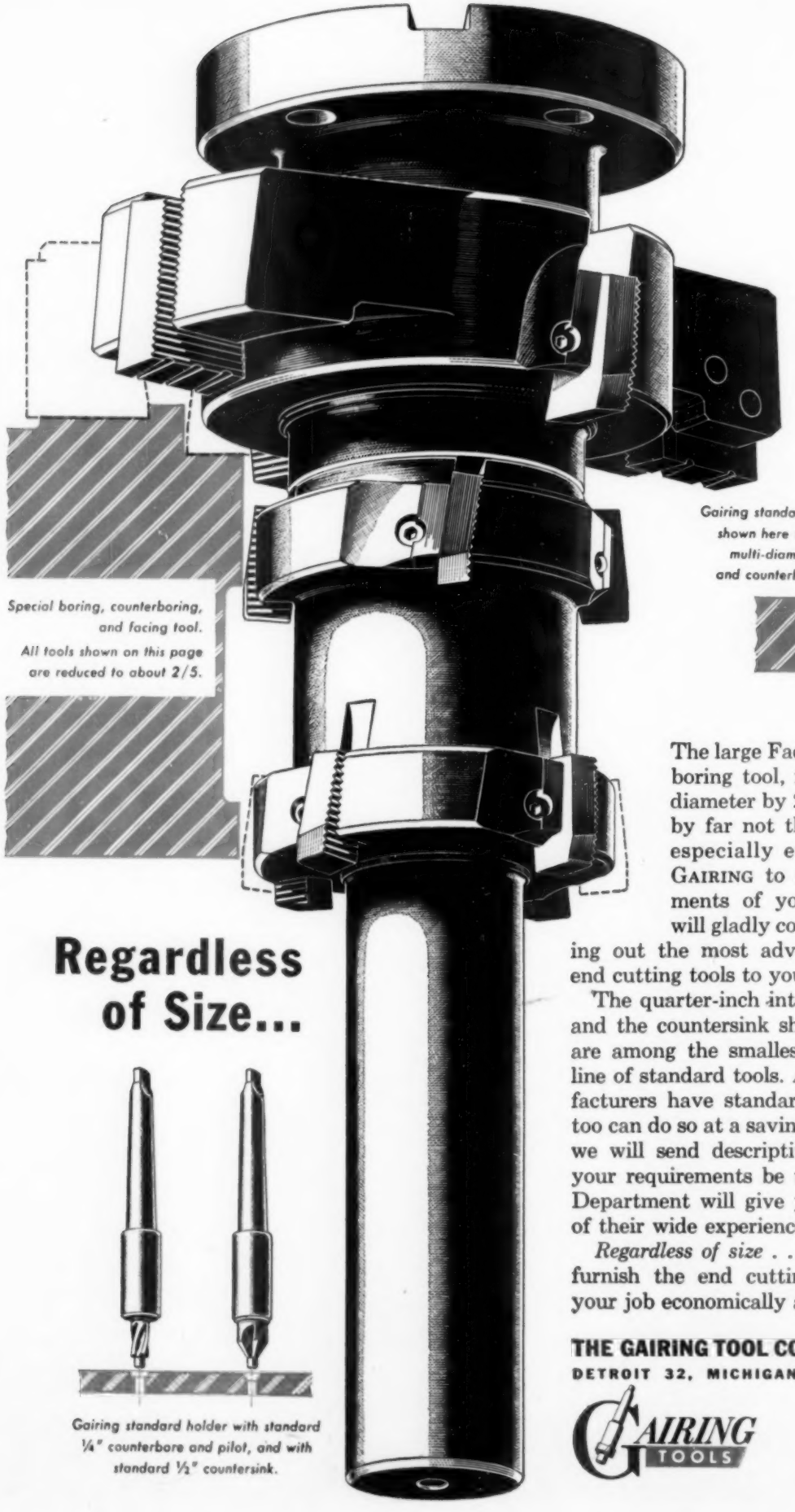
DV59 HIGH SPEED PRECISION LATHE

FEATURES

- Steel Dovetail Bed
- Three-Point Bed Mounting
- Headstock with Center Drive
- Patented Positive Lock Slide Rest
- Full Bearing Tailstock Spindle
- 1" Collet Capacity
- 9" Swing
- Speeds to 4000 r.p.m.

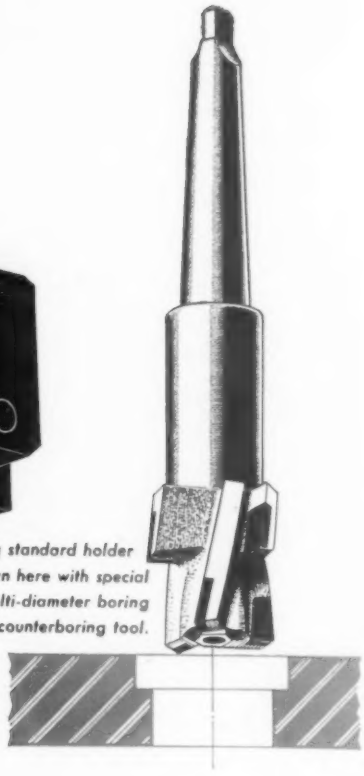
HARDINGE BROTHERS, INC.
ELMIRA, N. Y.

GREATEST ADVANCEMENT IN PRECISION LATHE CONSTRUCTION



Special boring, counterboring, and facing tool.

All tools shown on this page are reduced to about 2/5.



Gairing standard holder shown here with special multi-diameter boring and counterboring tool.

Regardless of Size...

Gairing standard holder with standard ¼" counterbore and pilot, and with standard ½" countersink.

The large Facing, Boring and Counterboring tool, measuring 13½ inches in diameter by 23 inches long, is one (but by far not the largest) of those tools especially engineered and built by GAIRING to suit the specific requirements of your production jobs. We will gladly cooperate with you in working out the most advantageous application of end cutting tools to your product.

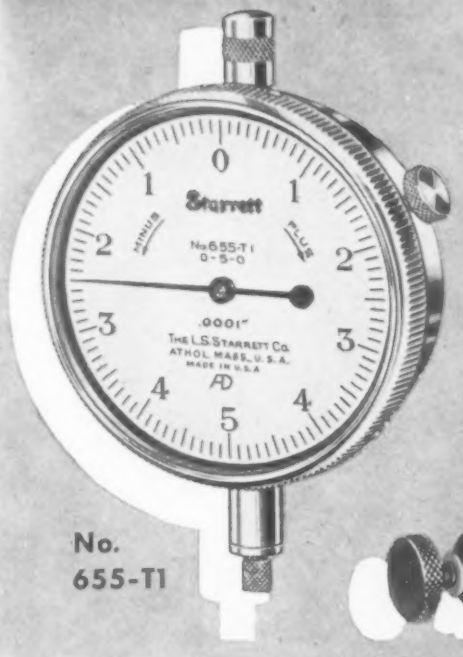
The quarter-inch interchangeable counterbore and the countersink shown at the extreme left, are among the smallest of GAIRING'S complete line of standard tools. A great number of manufacturers have standardized on them, and you too can do so at a saving. Outline your needs and we will send descriptive literature. Or, should your requirements be unusual, our Engineering Department will give your problem the benefit of their wide experience.

Regardless of size . . . GAIRING will furnish the end cutting tools to do your job economically and well.

THE GAIRING TOOL COMPANY
DETROIT 32, MICHIGAN

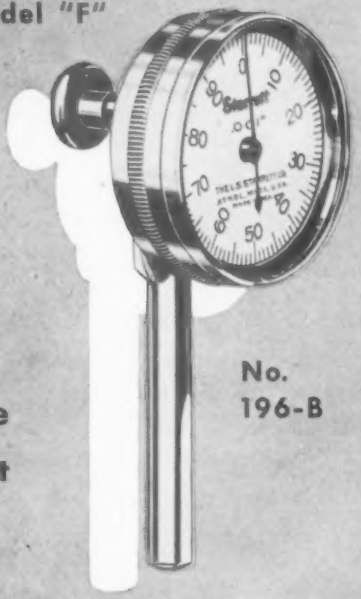
GAIRING TOOLS

THREE STARRETT LEADERS



No. 655-T1

LAST WORD
No. 711-F
Model "F"



No. 196-B

Countless Applications Prove These STARRETT Dial Indicators Meet Most Production Inspection Needs

In the size and range you need, calibrated as you want it, one of these popular STARRETT Dial Indicators will fit into almost any multiple measuring or production inspection arrangement you can imagine. Write for a copy of STARRETT Dial Indicator Catalog "E" (Third Edition). Keep it handy. It solves the problem of where to find the right Dial Indicator for any application.

Buy Through Your Distributor

THE L. S. STARRETT CO. · ATHOL · MASSACHUSETTS · U. S. A.

World's Greatest Toolmakers

STARRETT

PRECISION TOOLS • DIAL INDICATORS • STEEL TAPES • GROUND FLAT STOCK

HACKSAWS • BAND SAWS FOR CUTTING METAL, WOOD, PLASTICS

STARRETT DIAL INDICATORS

George Westinghouse

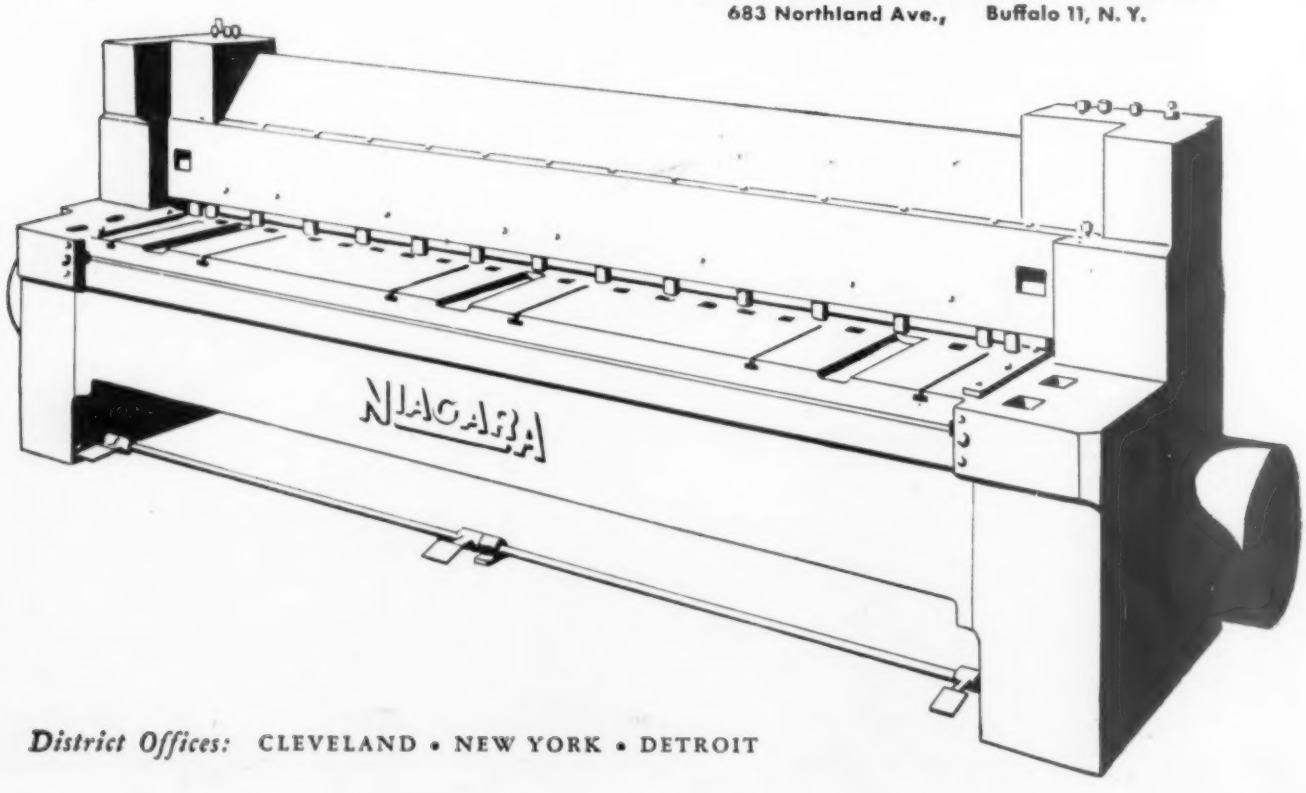
Great Names in America's Progress

● The name George Westinghouse is an honored name not only in industry but in many industries. First prominent through the invention of the air brake, the name and genius of Westinghouse is associated with hundreds of other products known for utility, performance and service to people everywhere. Niagara presses, shears and other machines for working sheet metal are important in the production of an infinite number of products bearing the Westinghouse name. Men responsible for production economy are invited to look into the advanced design of Niagara machines.

NIAGARA

MACHINE AND TOOL WORKS

683 Northland Ave., Buffalo 11, N. Y.



District Offices: CLEVELAND • NEW YORK • DETROIT

these FIRTHITE *tools*

will do 85% of your machining jobs!

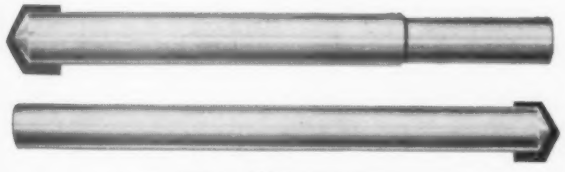
GENERAL PURPOSE TOOLS

Grades HA, TA & TO4

FIRTHITE STYLE GPS GRADE
FIRTHITE STYLE GPT GRADE
FIRTHITE STYLE GPE GRADE
FIRTHITE STYLE GPS GRADE
FIRTHITE STYLE GP3 GRADE
FIRTHITE STYLE GPG GRADE
FIRTHITE STYLE GP ST GRADE

MASONRY DRILLS

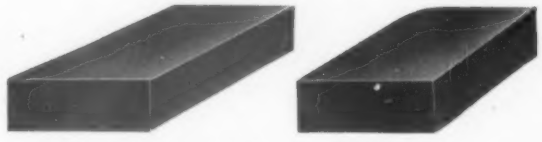
Grades H & HA



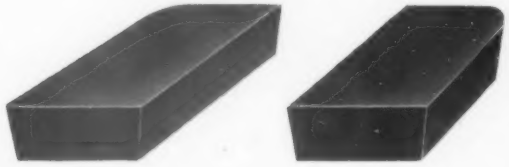
PROMPTLY AVAILABLE FROM STOCKS

use STANDARD FIRTHITE TIPS

to make your own special tools



Grades H, HA, TO4, TA, T83 & T16

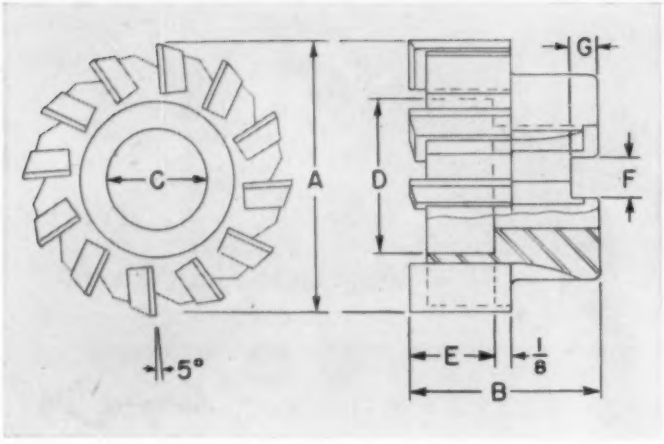


A wide coverage of tips and tools to meet practically all of your regular machining needs. Prompt shipments from adequate stocks at minimum prices. Readily adaptable by simple hand grinding to fit your specific requirements.

Call **Firth Sterling**

STEEL & CARBIDE CORPORATION

McKEESPORT, PA. • NEW YORK • HARTFORD • PHILADELPHIA • PITTSBURGH • CLEVELAND • DAYTON • DETROIT • CHICAGO • LOS ANGELES



HAYNES STELLITE shell end mills consists of HAYNES STELLITE cobalt-base alloy blades brazed into a tough alloy steel body.

Mill it Faster with HAYNES STELLITE Milling Cutters!

HAYNES STELLITE milling cutters with brazed-in blades are designed especially for faster milling. End mills, such as the one illustrated above, are operated on cast iron, malleable iron, and semisteel, with a chip load of 0.010 to 0.015 in. per tooth. They are used on mild steel with a load of 0.005 to 0.010 in. per tooth. On non-ferrous metals, and on plastics, hard rubber or fiber, the chip load is often increased to 0.030 inch.

These high-production tools can operate at surface speeds of 300 ft. per min. on cast and malleable irons . . . 600 ft. per min. on brass . . . 1,200 ft. per min. on aluminum.

Diameter (A)	Thickness (B)	Hole (C)	Counterbore		Drive Slot		Size of Blades	No. of Teeth
			(D)	(E)	(F)	(G)		
1¼	1	0.500	11/16	3/8	0.260	5/32	3/16 x 1/4 x 1/2	8
1½	1⅛	0.500	3/4	1/2	0.260	5/32	3/16 x 5/16 x 5/8	10
1¾	1¼	0.750	11/16	1/2	0.322	3/16	3/16 x 5/16 x 5/8	10
2	1⅜	0.750	1⅛	5/8	0.322	3/16	3/16 x 3/8 x 3/4	12
2¼	1½	1.000	1⅜	3/4	0.385	7/32	3/16 x 3/8 x 7/8	12
2½	1⅝	1.000	1⅜	7/8	0.385	7/32	3/16 x 1/2 x 1	14
2¾	1⅝	1.000	1⅝	7/8	0.385	7/32	3/16 x 1/2 x 1	14
3	1¾	1.250	1⅞	1	0.510	9/32	1/4 x 1/2 x 1⅛	14
3½	1⅞	1.250	2⅛	1⅛	0.510	9/32	1/4 x 5/8 x 1¼	16
4	2¼	1.500	2½	1¼	0.635	3/8	1/4 x 5/8 x 1⅜	18

Send For Free Booklet

For more information on HAYNES STELLITE high-production cutting tools not only for milling, but also for turning, boring, facing, and other operations, write for the booklet, "HAYNES STELLITE Metal-Cutting Tools," Form 5401.

Sizes other than those shown in the table can be supplied, and standard blades are also available for inserted blade cutters.

HAYNES TRADE-MARK alloys

Haynes Stellite Company

Unit of Union Carbide and Carbon Corporation

UCC

General Offices and Works, Kokomo, Indiana

Chicago — Cleveland — Detroit — Houston — Los Angeles — New York — San Francisco — Tulsa

The registered trade-marks "Haynes" and "Haynes Stellite" distinguish products of Haynes Stellite Company.

PRESS PRODUCTION

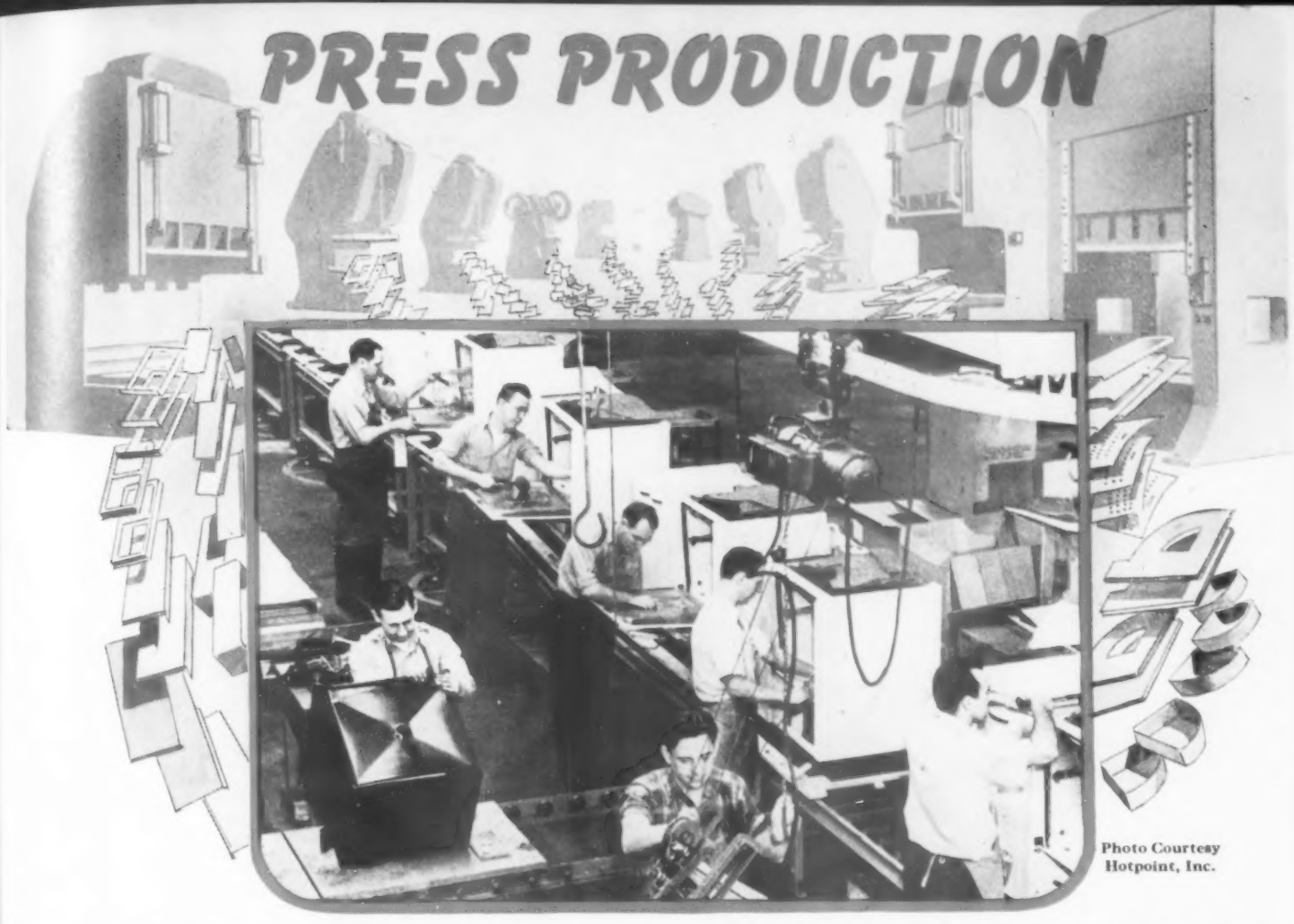


Photo Courtesy
Hotpoint, Inc.

FEEDS THE ASSEMBLY LINE

The Assembly Line—symbol of American Mass Production—depends on a rapid and constant flow of finished parts to each stage of the assembly.

Largely responsible for keeping the line moving, Presses provide the fast, all-around production of duplicated metal parts that modern standards of production demand.

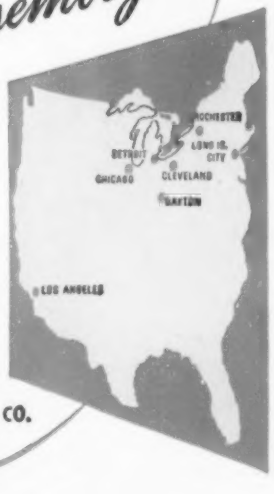
Danly Die Sets—a *necessary part of good Presswork everywhere*—speed die making programs, protect costly dies, cut down time for regrinds. Danly Die Sets and Die Makers' Supplies are nationally recognized for *known dependable accuracy.*

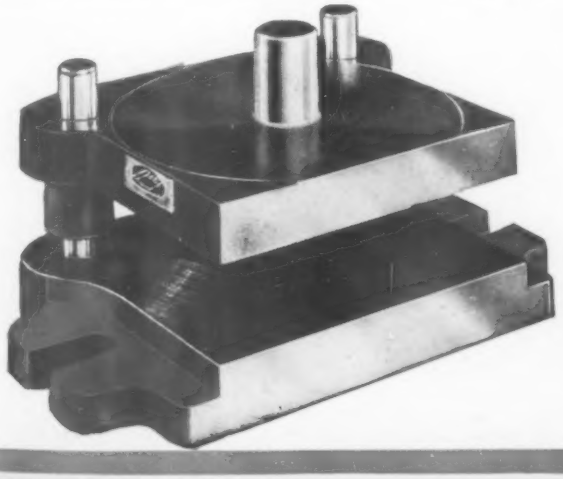
DANLY MACHINE SPECIALTIES, INC.
2100 South 52nd Avenue • Chicago 50, Illinois

DANLY
National Assembly

Call Danly

- **MILWAUKEE 2**
  111 East Wisconsin
- **DETROIT 16**
  1549 Temple Avenue
- **CLEVELAND 14**
  1550 East 33rd Street
- **DAYTON 2**
  990 East Monument
- **ROCHESTER 4**
  16 Commercial Street
- **PHILADELPHIA 44**
  18 W. Chelten Avenue
- **LONG ISLAND CITY 1**
  47-28 37th Street
- **DUCOMMUN METALS & SUPPLY CO.**
  4890 South Alameda, Los Angeles

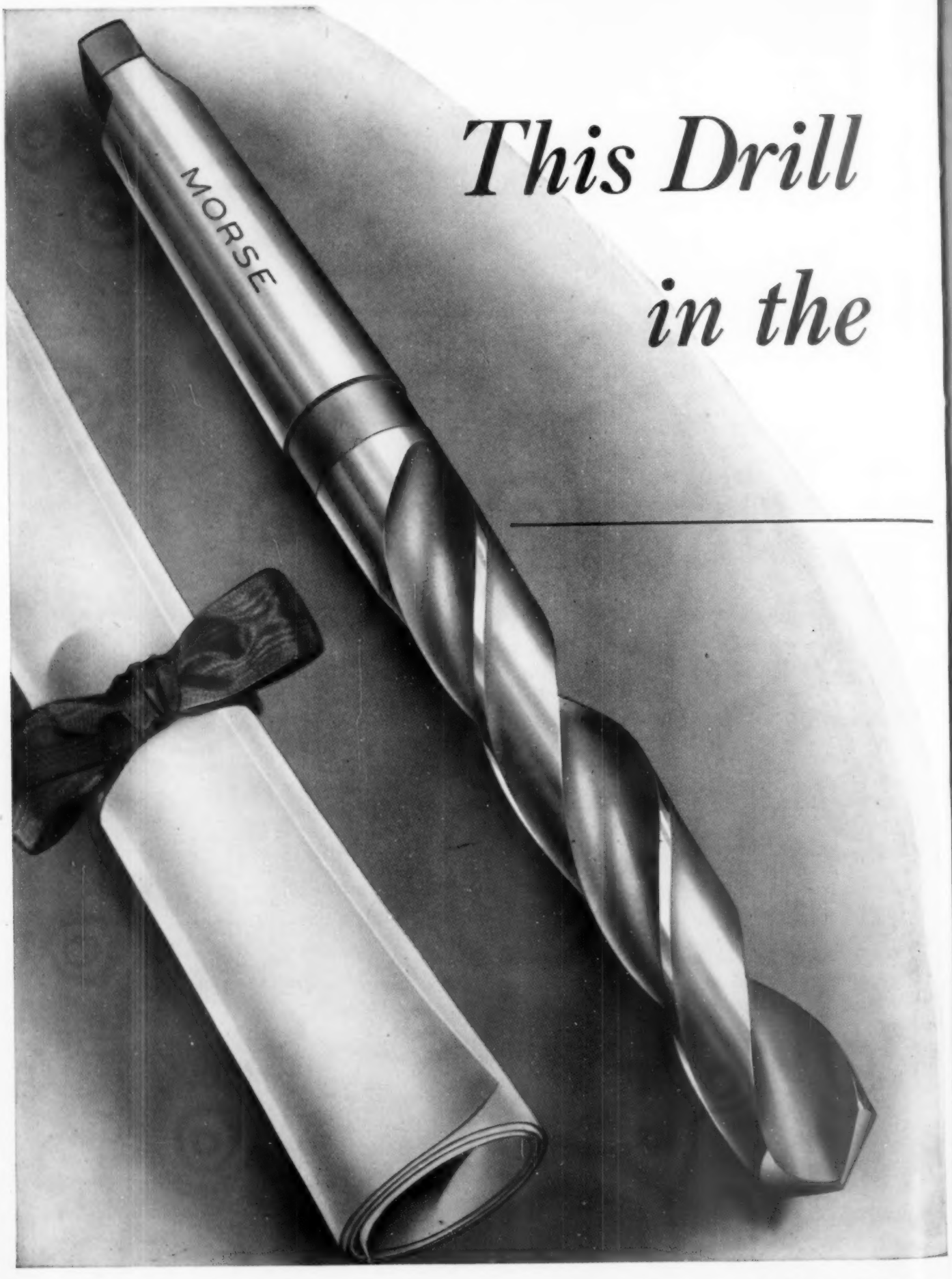




DIE MAKERS' SUPPLIES

DANLY DIE SETS

Welded Steel Fabrication



This Drill in the

Graduated with Honors

"College of Hard Knocks"!

MORSE FORGED TAPER SHANK DRILL
Forged for Toughness—
Milled and Ground to Morse Precision Standards

Here's a drill that offers a "liberal education" in serviceability and cutting efficiency. It's forged for strength and toughness, then milled and ground to the precision accuracy that's typical of all Morse tools. In addition, the *helix angle* selected for this drill is the result of long study to obtain greatest efficiency for cutting operations.

All these features *combined* provide you with an all-purpose drill that will earn its keep many times over—whether drilling gear forgings, connecting rods, crankshafts, cast iron, chrome nickel steels, etc. Buy this drill—it'll fill your bill! Your Industrial Supply Distributor can supply you.

Accuracy, Quality, Uniformity: the MORSE Code of Cutting-Tool Manu

MORSE TWIST DRILL & MACHINE COMPANY

The Original Manufacturer of Twist Drills

NEW BEDFORD, MASSACHUSETTS

New York Store: 130 Lafayette St. • Detroit Store: 2952 East Grand Blvd. • Chicago Store: 570 West Randolph St. • San Francisco Store: 1180 Folsom St.

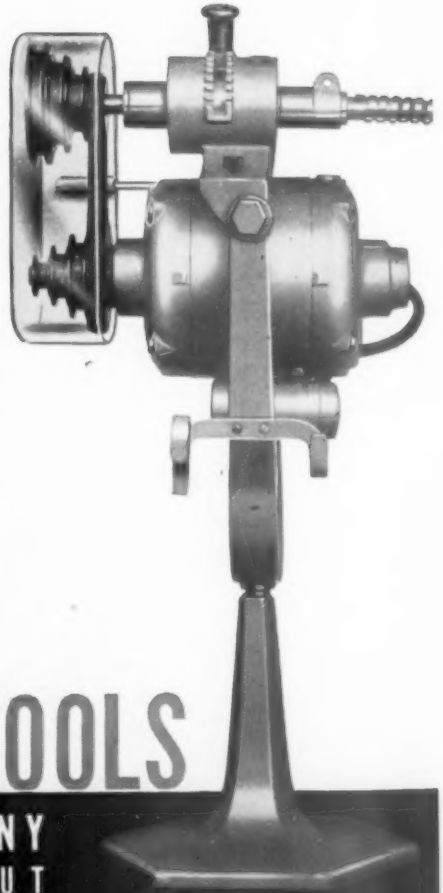
Power and SPEED FOR CARBIDE ROTARY FILES

with the JARVIS "75"

The Multi-Jarvis "75" flexible shaft machines provide the ultimate in extra power and constant high speed for use with tungsten carbide rotary files. Tough jobs are made easy... operator fatigue is held to the minimum.

The Jarvis "75" is available in bench, roller-floor (with tool tray), overhead-suspended-trolley and overhead-suspended-saddle types. Bench and floor units swivel horizontally and vertically. All models are equipped with transparent plastic guards.

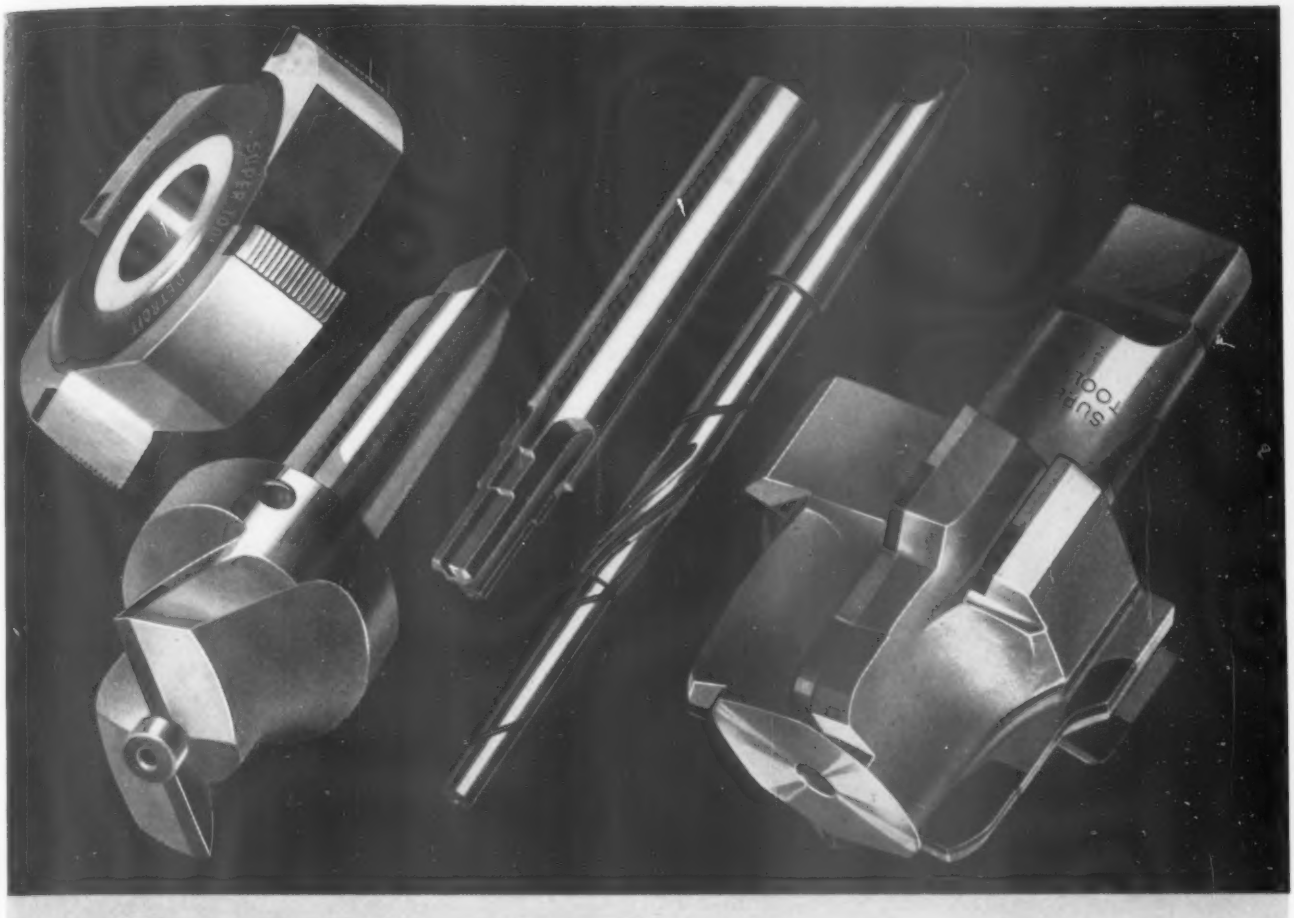
Jarvis tungsten carbide rotary files are ground-from-the-solid and are available in standard sizes in fine, standard or coarse fluting. Write for literature on Jarvis Power Tools.



Jarvis POWER TOOLS

THE CHARLES L. JARVIS COMPANY
MIDDLETOWN IN CONNECTICUT

Tapping Attachments • Flexible Shafts and Machine • Quick Change Chucks and Collets • Rotary Files



SUPER *Carbide Tipped* SPECIAL TOOLS

SUPER *Carbide Tipped* STANDARD TOOLS

EJECTOR-TYPE TOOLS
DRILLS
REAMERS
SPOTFACERS
FORM TOOLS
WEAR PARTS
BORING TOOLS
MILLING CUTTERS
SHAVING TOOLS
CENTERS
GRINDER RESTS
COUNTERBORES

Get the benefit of *Super's* many years of experience, solely in the field of Carbide Tipped Tools.

It will pay you dividends.

Special Tools to your specifications — Carbide Tipped — Solid Carbide—all produced by *Super* skilled engineers and craftsmen.

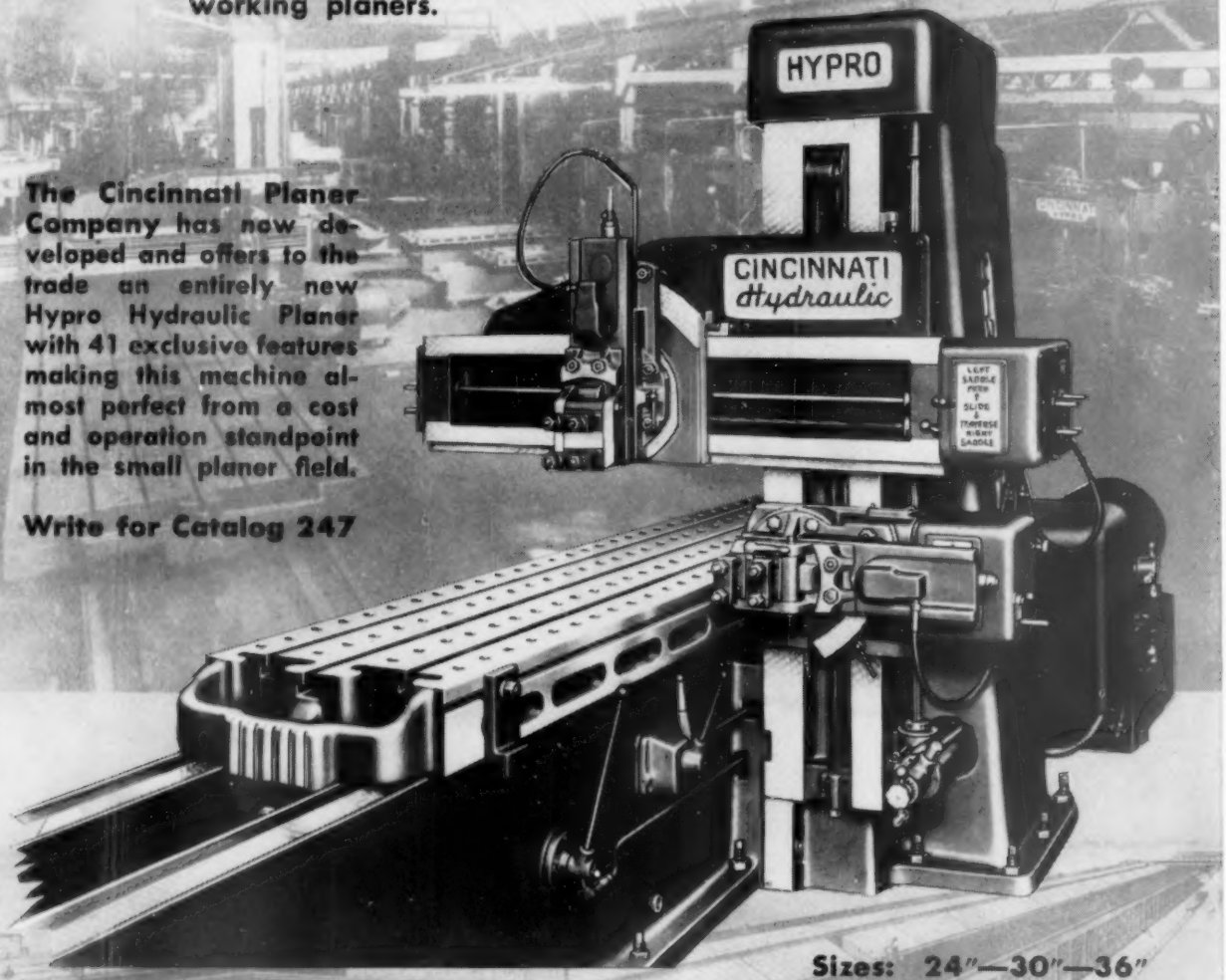
SUPER TOOL COMPANY

Carbide Tipped Tools

21650 Hoover Road, Detroit 13, Michigan ★ 5210 San Fernando Road, Glendale 3, California

A New Hypro Planer

Look at its Background... 50 years of continuous proven leadership in the design and manufacture of metal working planers.



The Cincinnati Planer Company has now developed and offers to the trade an entirely new Hypro Hydraulic Planer with 41 exclusive features making this machine almost perfect from a cost and operation standpoint in the small planer field.

Write for Catalog 247

Sizes: 24"—30"—36"
Double Housing or Openside

THE CINCINNATI HYPRO PLANER COMPANY

PLANERS · BORING MILLS · PLANER TYPE MILLERS

CINCINNATI, OHIO

A BUYING GUIDE FOR ABRASIVES

POINT No. 5

PRODUCT APPLICATION

Supplying abrasives of highest quality is but one way in which The Carborundum Company serves industry. Considered equally important by many users is the attention directed to correct use of these products. For this purpose The Carborundum Company has established a special group of product application engineers.

This group studies, appraises and charts abrasive applications. New improved methods and better abrasive products are often turned up. CARBORUNDUM engineers are also called in to help in selecting the best abrasives to use for specific jobs and in specifying their application. The end result is better grinding, sanding and finishing at lower overall cost . . . another reason pointed to in preferring abrasives by CARBORUNDUM. The Carborundum Company, Niagara Falls, New York.

A Good Rule for Good Grinding . . . CALL IN

CARBORUNDUM

TRADE MARK

BONDED ABRASIVES

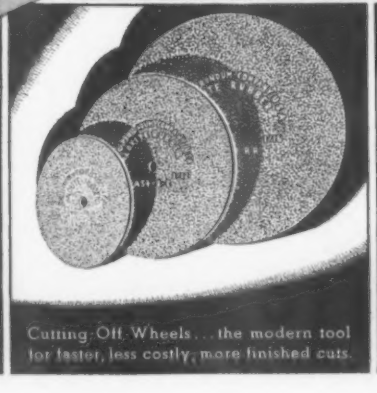
COATED ABRASIVES

ABRASIVE GRAINS AND FINISHING COMPOUNDS

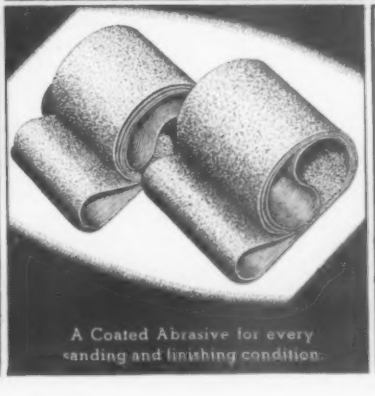
Tool Room sticks and stones that cut fast . last long . and hold their form.

Mounted wheels, in all standard grits and grades, for portable grinding equipment

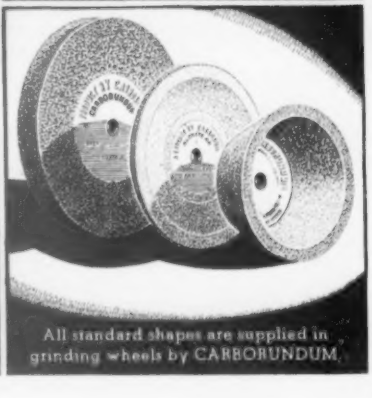
"Carborundum" is a registered trademark which indicates manufacture by The Carborundum Company.



Cutting-Off Wheels . . . the modern tool for faster, less costly, more finished cuts.

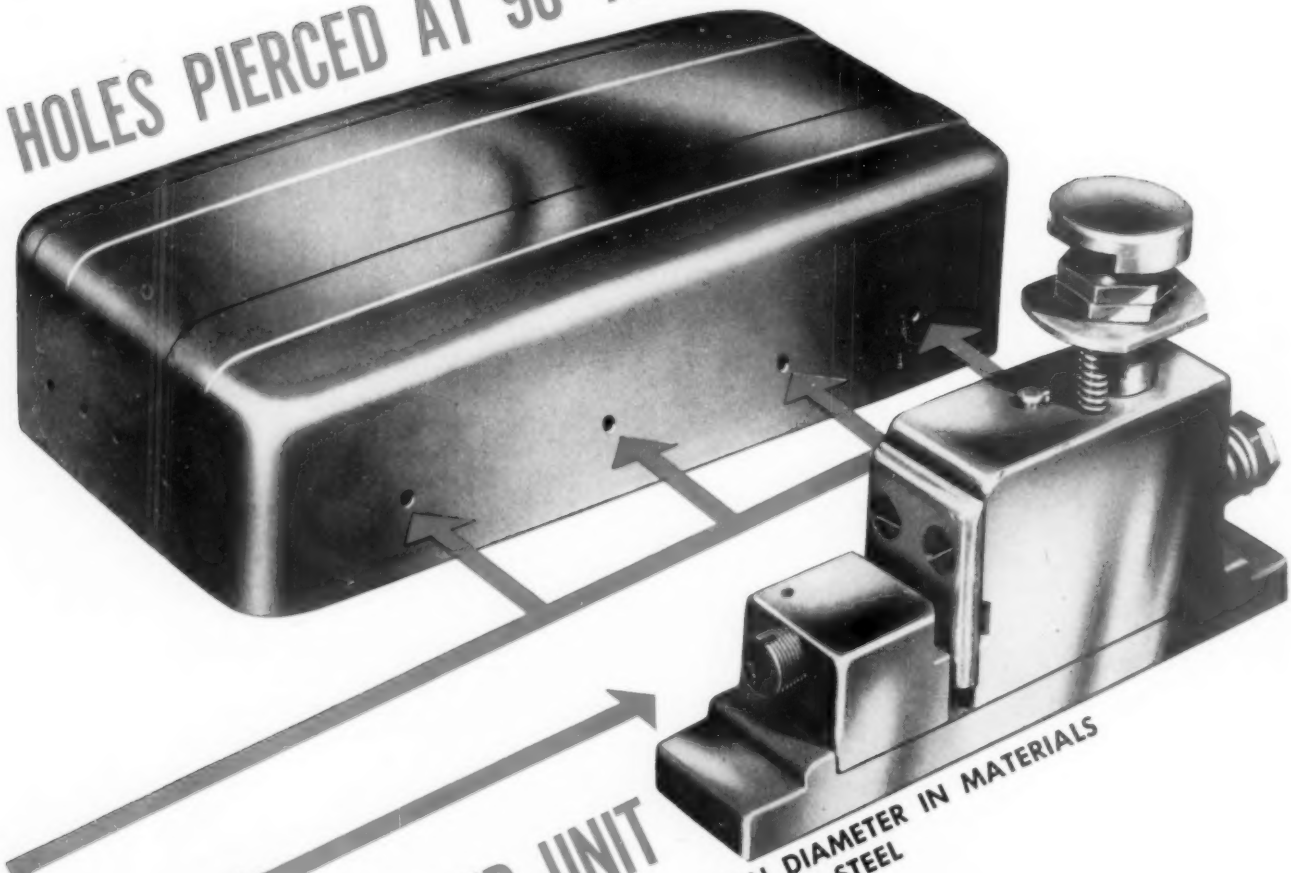


A Coated Abrasive for every sanding and finishing condition.



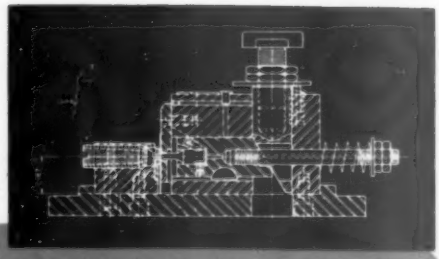
All standard shapes are supplied in grinding wheels by CARBORUNDUM.

HOLES PIERCED AT 90° ANGLE . . .

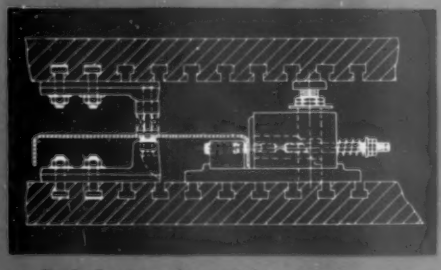


with NEW WHISTLER UNIT

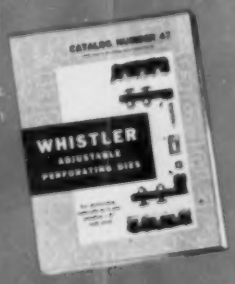
PERFORATES HOLES UP TO 1/2" IN DIAMETER IN MATERIALS TO 1/16" THICK MILD STEEL



Detailed drawing showing operation of HU-50 90° Perforating Unit.



Typical set-up shows 90° perforating unit operated in conjunction with standard perforating equipment.



DETAILS EXPLAINED IN CATALOG NO. 47

Get the facts about this 90° perforating unit in a hurry. Your copy of this catalog will be sent at once upon request.

Extruded shapes, ells, angles and other molded, shaped or fabricated pieces are easily pierced from the side at 90° with HU-50 Perforating Units. Quickly set up and adjustable, these units may be used separately or with standard perforating equipment. The advantages provided by other Whistler Adjustable Dies are retained. Absolute accuracy is assured. Quick change-over of hole arrangements can be made . . . in many cases, on the press. Production economies and speeded up operating schedules are effected. Continued re-use of units in different groupings spreads initial cost.

It makes sense to look into the use of Whistler Adjustable Dies for all perforating, notching, slitting or rounding operations.

S. B. WHISTLER & SONS, INC.

744 MILITARY ROAD — BUFFALO 17, NEW YORK

« There's Gold in Human Engineering »

SKILLED OBSERVERS who have kept sensitive fingers on the pulse of our industrial democracy warn that steps must be taken quickly and intelligently to improve human relationships in industry. If their warnings are not understood and heeded, strikes will increase both in number and intensity, production cannot be maintained, and those peddling collectivist and authoritarian ideologies will find more fertile ground upon which to sow their destructive seed.

Experts in the field of industrial relations, with a preference for long words, use the term "psychological factors" in describing the influences which improve or impair the relationships of individuals and groups. The rapidly developing science of understanding and controlling these factors is sometimes referred to as "human engineering." This is a rather realistic term and one that can be appreciated by men in industry who deal with human problems.

A scientific approach to problems of industrial relations has a definite dollars and cents value. Controlling some of the factors involved is solving for some managements an ever increasing number of problems of many and sundry varieties. The more common ones are: decreasing absenteeism, increasing productivity per man hour, developing pride in workmanship, improving company spirit and loyalty, and preventing strikes.

One has to but realize that 139,000,000 man days were lost in 1946 because of strikes to appreciate what might be accomplished in actual dollars and cents through the practice of better human relations.

Speaking recently before a group of public relations executives in New York City, Dr. Claude Robinson, President of Opinion Research Corporation, Princeton, New Jersey, had this to say:

"A strike is a psychological phenomenon that results from clashing ambitions of men or groups of men and from ignorance of fact. In good part, strikes occur because of faulty communication."

Dr. Robinson means that in too many cases the lines of communication between the carpeted sanctum and the shop are in bad order. The men in both domains must, through improved communication and thus a better understanding of each other, learn to live together with tolerance. The lines of communication must be put in order and kept clear.

In our communications, it must be kept in mind that all men are motivated to action by two factors: intelligence and emotion. The conduct of the vast majority springs largely from emotional thinking. It is, therefore, necessary to inject a great deal of enthusiasm coupled with simple logic into any human relations program, if it hopes to gain popular support. Enthusiasm is contagious, especially among individuals who react largely from their emotions. Thus, proper efforts will usually be rewarded with the development of the capacity for enthusiasm among both workers and executive employees.

Teaching people to be emotionally stable and mature is a long, hard process . . . and virtually impossible in a great many cases. But skilled human engineering technicians have developed techniques and avenues of communication that are working wonders in a great many enterprises. They have learned to utilize to the fullest the benefits of such media of expression as plant bulletin boards, employee publications, visual aids, public address systems, ordinary letters, and hundreds of other ways of reaching individuals and groups.

There is enormous potential power in properly-organized, skillfully-executed industrial and human relations programs. They must be carried out by personnel or agencies who understand the techniques.

There is gold in these unmined hills if only business and industry will dig for the answers in human engineering. Good attitudes through good relationships mean profits on the company's balance sheet and money in the worker's savings account.

W. B. Peirce

President 1947-48

By Philip G. Fishback

Screening vs. Sampling in Inspection

If You Slip Up on Floor Inspection Anywhere Along The Line, "Your Slip Will Show" in Final Assembly

MORAL OF THAT ANCIENT TALE, relating how, for lack of a nail, a horseshoe and a horse, a battle, a war and a kingdom were successively lost, can also be applied to failure during inspection to detect and correct an error in the machining or forming of some infinitesimal part. In the progress of future operations, such a lapse may not lose a kingdom, but it can bring troubles swarming around your head like squadrons of disgruntled hornets. And, any accumulation of such minute errors can well create a hardening of your production arteries that are not conducive of dividends.

Philip G. Fishback **has been previously introduced to our readers, his article on "Planned Simplified Inspection," in November, 1946,** ***The Tool Engineer,*** **having created considerable interest. A member of Rochester Chapter, A.S.T.E., and active in quality control programs, Mr. Fishback is Quality Control Engineer for Graflex, Inc.**

An efficient *Process Inspection*, generally called "floor inspection," must act as your greatest safeguard in avoiding such a condition. For, as we all know, when errors are detected and corrected in the beginning, before given a chance to accumulate, the completed parts are easier to assemble into a smooth operating, proper functioning whole. Thus, workers will be happier because they know that your product will be good.

Hence, process inspection is a very important cog of the inspection wheel and can only speed up and simplify subsequent inspection routine and procedure if every floor inspector is ever alert. To achieve this condition involves a study of the manufacturing methods and setting up a correct process inspection procedure, viz.: (a) Spot checking the material and parts at various stages of production, maintaining high quality, detecting possible errors. (b) Recording such errors and their causes for future reference so that, on subsequent runs of identical parts, a repetition of such mistakes may be avoided by first removing the causes.

When we provide the inspector with a suitable form whereon to record these errors and their causes, such a recording is neither difficult nor time consuming and should be made a definite part of the inspector's duty.

Reduction of Hazards

You may find that the discrepancy is often due to some fault in the tool used in the machining or forming of the part, but this hazard can be greatly modified if the procedure set forth under the caption of *Tool Inspection* in the "Planned Simplified Inspection" article, which was published in the November '46 issue of *The Tool Engineer*, is adhered to.

Most important of all, you will find that when floor inspection is functioning efficiently, then "parts inspection", will be simplified. Inspection costs will be lower, too, because in many cases "screening," or one hundred per cent inspection, can make room for some "sampling plan" enabling the inspection department to do a greater volume of actual inspection work with a reduced personnel and consequently at lower cost.

That is the prime object of any sampling plan. But, unless your floor—"at the machine"—inspection is efficient to the nth degree, any sampling plan that you may adopt will have two strikes against it.

Importance of Keeping Records

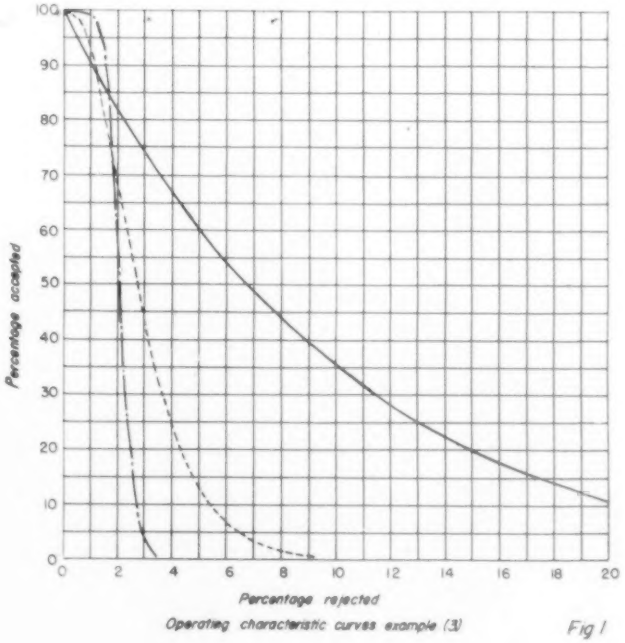
Also, it is well to bear in mind that it is not only the duty of inspection to detect imperfect parts but in order that production may improve on future runs of like parts, we must *record* that which we have learned in such a way that this information will be automatically present. Let it be simple, understandable and usable, so that it may be put to work.

Only thus will our mistakes of the past operate for the benefit of the future. When such information is properly acted upon, it will not only improve the quality of the product, but will cut production costs and eliminate the re-working of many defective parts and will decrease, rather than increase, that scrap pile.

So, having established an efficient process inspection, we can now consider substituting some sampling plan for screening. For we must remember that "screening" is, without question, the only plan that will guarantee the rejection of all defective items, and defective items only. However, such perfection can only be approached if suitable auto-

10% Single Sampling Plans

Lot size	Sample size	Acceptance number	Rejection number
—— 100	10	0	1
- - - - 1,000	100	2	3
— — 10,000	1,000	20	21



Operating characteristic curves example (3) *Fig 1*

matic machines and gages are available (and often they are not) as, without them, the inspector will be subjected to a load so excessive as to impair his accuracy—thus another reason why sampling procedures deserve consideration.

Although, in screening, each part is inspected and either accepted or rejected; in sampling—or "lot by lot" inspection—only a portion of the items are inspected, and entire groups of items called "inspection lots" are accepted or rejected on the basis of the information derived from the inspection of specific quantities of samples selected at random from inspection lots.

100% Inspection of Critical Parts

Evidently, then, the greater degree of control on quality that has been maintained by floor inspection, the smaller will be any risk of error that we will be subjected to in the acceptance or rejection of an inspection lot when we adopt a sampling plan. Of course, critical parts, or assemblies performing important functions or those which may be hard and laborious to replace (should repair become necessary) must be inspected one hundred per cent.

In our selection of a sampling plan we must also consider what plan will give the best possible balance between cost of administration and operation, and the value of the product being inspected; and, this must be done most judiciously. All things being equal, the amount of inspection should be lower for inexpensive items than on a more expensive product. In other words, the plan adopted must affect both the inspection cost, as well as the quality protection that it will provide. That's important because, after all, a manufacturer's reputation for a quality product hinges upon his ability to make quality an inherent part of his product.

We must remember that there is a definite risk, in any sampling plan that may be adopted, because there can be no definite guarantee assuring complete separation of defective items from non-defective items. The inspection lot that we accept may contain some defective items; and sometimes a low quality lot—that is, a lot containing many defective items—will be accepted, while at other times a really high quality lot will be rejected. Obviously then, we revert to the fact that such hazards are minimized only by the actual quality that has been maintained by process inspection.

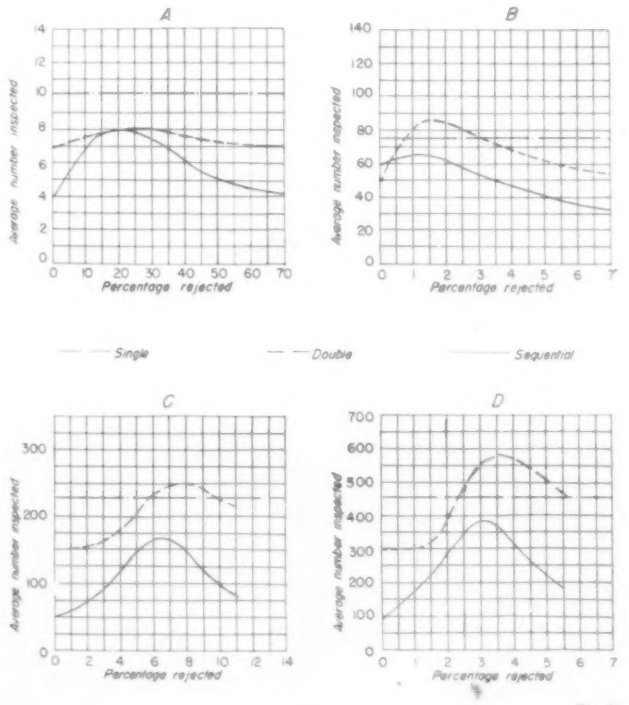


Fig 2

In any sampling plan, the protection afforded does not depend so much upon the quantity of items inspected as upon the percentage of acceptable parts or items in any series of inspection lots. The prime factor lies in detecting the defective part, because the performance of high quality parts in any assembly is less dramatic than a failure in that same assembly due to a single defect.

However, the information derived from each sample should provide a basis for action, with regard to the production process—as, for example, whether to leave the process alone or to investigate, with the expectation of finding assignable causes for defectives and being able to eliminate them. While it is not the inspector's job to teach manufacture how to make a product, it is definitely his job to help discover the why and wherefore of low quality and to offer constructive suggestions for improvement.

On large runs, where we have two or more inspectors sampling similar parts, they may differ in their relative frequency of finding some particular defect. This may be due to a difference in the technique of the inspectors and calls for prompt investigation by the supervisor.

The writer believes that all sampling plans can be operationally grouped in three types, which we will call the *single*, the *double* and the *sequential* plan. And while any one of these plans may prove suitable for any one particular item or product, a different plan may work to greater advantage on a different item or product. However, no plan is exclusively best for all practical situations. Each plan has its merits and its own disadvantages and, on rare occasions, a combination of plans may give a truer answer. But before discussing these plans, and their relative merits and disadvantages, a few rules governing the selection of samples from inspection lots will not be amiss.

Irrespective of the plan adopted, the samples taken from any one inspection lot should be drawn blind or "at random." You will find that, when samples are drawn from different parts of the tray (or rack), and that when the location on the tray from which samples are drawn is continually changed, that a truer verdict of actual quality of a series of inspection lots can more readily be judged. Let manufacture know that each piece has as good a chance of being chosen as any other piece.

What Not to Do

Finally, before discussing the question of what plan to adopt for any particular item, the following rules on what not to do should never be overlooked, as these rules apply to each of the plans we propose to consider:

1. Do not combine items or products from different batches of raw material, or from component parts obtained from different sources, in any one inspection lot.
2. Do not combine items or products from different production lines or produced by different methods in any one inspection lot.
3. Do not combine items or products from different shifts in any one inspection lot.
4. Do not combine products produced from different molds, from different patterns, or from different dies in any one inspection lot.

Single Sampling

Rather, keep these various items segregated and form individual inspection lots, from such batches, to help in getting a truer verdict. And now, after discussing *what to do* and also what *not to do*, as well as the risk of error involved, let us look at these various sampling plans.

Various methods governing single sampling procedures have been worked out, and while a study of these procedures impresses us with their simplicity, the protection afforded seems questionable. One authority has stated that "Single sampling means the inspection of just one sample per in-

spection lot." However, he failed to give either the size of the inspection lot or the size of the sample to be drawn, presumably contending that an entire inspection lot should be accepted or rejected on the basis of the acceptability or non-acceptability of the sample inspected.

The Navy Department, in a late revised manual on "Sampling Inspection Procedures" gives three examples of how single sampling be conducted:

> Example No. 1 instructs the inspector to form inspection lots of 3,400 items each, and to draw 225 samples from each inspection lot. Each of these samples must pass the quality test, viz.: if 14 or fewer fail to pass the test, accept the lot; if 15 or more fail to pass, reject the lot.
>
> Example No. 2 calls for inspection lots of 100 items each to be formed, and that 2 samples be drawn from each lot. If both of these samples pass, accept the lot; if either or both fail, reject the lot.
>
> Example No. 3 specifies that inspection lots of various sizes be formed and that, from each of these lots, 10 per cent of the items in the lot be drawn for inspection samples. Each of these samples is then inspected and if two per cent or fewer of the inspected samples fail, accept the lot. Otherwise, reject the lot.
>
> The same authority later states, quote, "In single sampling it is advisable to inspect every item in the sample. If this is done, the number of items inspected by the Navy per inspection lot, is simply the number of items in the sample." (End of quote.)

The second and third examples, above, seem ideal for many situations; so, let us analyze these. Concentrating on example No. 3, the graph (Fig. 1) shows inspection lots of various sizes; one lot of 100 items, another of 1,000 items, and a third of 10,000. But a moment's study of this graph quickly convinces us that the seemingly simple coverage is rather deceptive. If an inspection lot contained only ten items, the rule calls for the drawing of, and inspection of only one sample. Thus, if an inspection lot of ten items contained 5 defectives, it would have an equal chance of being either accepted or rejected.

On the other hand, on an inspection lot of ten thousand, requiring a sample of one thousand, the entire lot would be accepted if twenty or fewer defective items were found in the sample. Obviously, inspection lots of this size, containing only 2.1 per cent defectives, would be rejected oftener than they would be accepted. By following this suggested plan we find that the smaller the inspection lot, the greater the chance of accepting defective parts.

Question of Rejects

It becomes evident that by following this procedure, we are apt to have a great many rejected lots, which brings up the question of what to do with these rejects. Naturally, we do not wish to build up the scrap pile, so we decide to re-inspect the rejected lots by screening to see what can be salvaged. Thus, single sampling tends to require more inspection time than any other plan and, on large lots, inspection time is unjustifiably high.

On accepted lots, we fail to have adequate protection, and we are also taking a rather long chance that a great many imperfect parts are being accepted. The only redeeming feature of these procedures lies in their simplicity of operation and the ease with which they can be explained to the inspector.

The writer believes that unless inspection is destructive of the item, so that if we continue inspecting all samples until there is nothing left of the product, single sampling will not give us a true quality test of the item. Besides, it entails too great a risk of error in accepting defectives and rejecting acceptable parts, thus leaving us in the position of an analyst with nothing to analyze. For this reason, let us shelve the single sampling plan until a condition arises that makes its use imperative—say as a last resort.

Double Sampling

In double sampling we have various plans available, as, for example, Army Ordnance, Dodge-Romig and Navy Standard. Any of these plans gives the product a "second chance" which makes sense to every one concerned in addition to being more economical, in the long run, than single sampling.

But the greatest advantage in selecting either a double or sequential plan lies in the fact that control charts are set up (as shown later in the Summary) that not only enable us to reach clear cut decisions but, through study of information provided thereon, enables Quality Control to make recommendations for improving the manufacture of the product.

We must keep in mind the old slogan: "Quality can not be inspected into a product—quality must be built in." And there is no question but that one of the most useful tools for analyzing quality information is the control chart. Putting this information to work will go a long way towards the elimination of defective parts; after all, the best way to assure acceptance of good product is to be certain that no defectives are manufactured.

Such control charts can also be set up for separate defects or malfunctions, rather than for defective items. The information derived may bring to light assignable causes for unacceptable parts, which good engineering can discover and often economically remove.

The Factor of Homogeneity

Furthermore, study of a series of control charts will indicate whether the product is homogeneous from inspection lot to inspection lot. Homogeneity (as applied to process) would indicate whether variations in quality are to be

Sampling Plans

AOQL (percent defective) >11.0 to —
AQL (percent defective) 5.3 to 6.4

Plan	Sample	Size	Total Samples: Size	Acceptance number	Rejection number
Single —·—	First	10	10	2	3
Double – – –	First	7	7	1	3
	Second	14	21	2	3
Sequential —	First	4	4	0	2
	Second	4	8	0	3
	Third	4	12	1	4
	Fourth	4	16	2	4
	Fifth	4	20	4	5

Operating Characteristic Curves

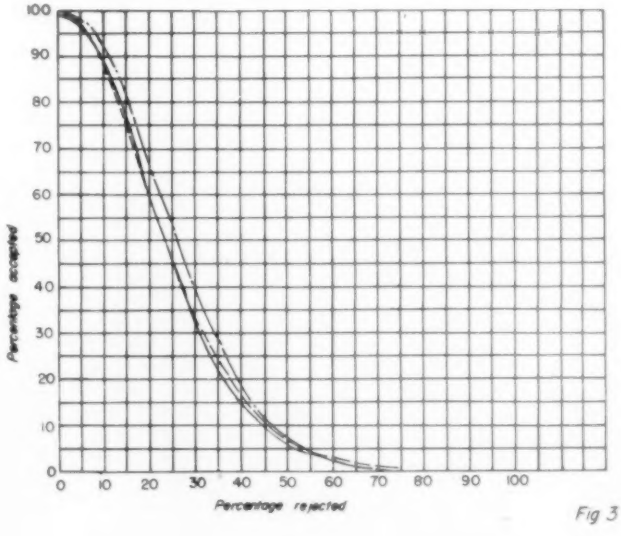


Fig 3

attributed to chance causes only, or causes other than chance. Such, for example, as lack of skill on the part of the operator, or the natural tendency of production to lower work quality standards under high pressure of intensive production; or, in so far as machine, tool, or process troubles may be responsible for variation in quality.

As contrasted to single sampling, in double sampling we give the product a second chance by having a fixed higher rejection quantity: the acceptance quantity of the second sample is one below the fixed rejectance quantity, which remains constant since it is governed by the inspection lot size and the quality desired.

In double sampling, our first sample acceptance quantity is always considerably lower than on second sample acceptance quantity. Thus, if a product meets the test of the first acceptance tolerance, we can reasonably ascertain the quality of the lot without too great a risk of error. After having analyzed our first and second sample, we combine our total amount of defects, and if this amount is below our rejection quantity, we accept the lot.

We must remember, when we test our second sample, that the quantity of rejects of the first sample limits the amount of rejects permitted in our second sample, thus restricting the quantity of additional rejects permissible by the acceptance border. This condition tends toward a much tougher standard of quality, so, if the product passes this double test, we may assume that its acceptance quality has been established.

The Sequential Plan

The various tables governing these inspection lots, as well as the readily available quality standard procedures established by Army Ordnance, Dodge-Romig and Navy Standard, require no further discussion here. So, let us now proceed to a discussion of the final method, that of a sequential plan.

This plan, rather than being just another sampling plan, has been advocated by many as having greater value, analytically, than either of the plans discussed heretofore, and is therefore commonly called "Sequential Analysis." Unquestionably, the information we derive from a study of the various charts and graphs, used in this procedure, can become of real value.

Sampling Plans

AOQL (percent defective) .90 to 1.5
AQL (percent defective) .32 to .65

Plan	Sample	Size	Total Samples		
			Size	Acceptance number	Rejection number
Single —·—	First	75	75	1	2
Double – – –	First	50	50	0	3
	Second	100	150	2	3
Sequential ——	First	20	20	–	2
	Second	20	40	–	2
	Third	20	60	0	3
	Fourth	20	80	1	3
	Fifth	20	100	1	3
	Sixth	20	120	1	3
	Seventh	20	140	2	3

– Acceptance not permitted

Operating Characteristic Curves

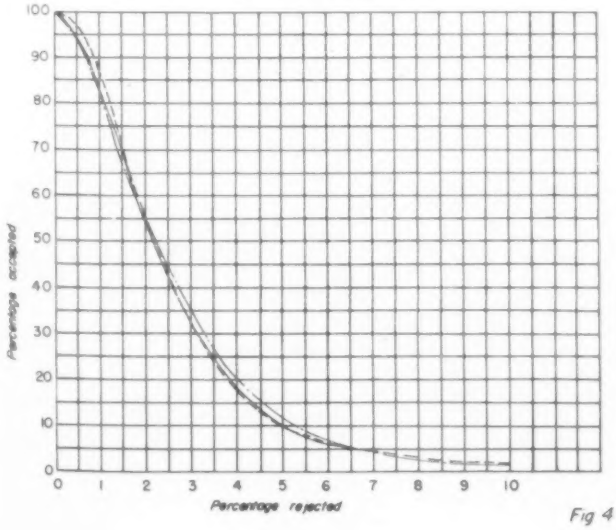


Fig 4

In both single, as well as double sampling plans, we follow the various fixed standard charts and tables, provided, to guide our decisions. But, when we adopt the sequential analysis plan, this commonly requires some calculation in setting up our test for quality since the preparation and working out of such plans generally requires the efforts of a competent statistician working in close harmony with the engineering staff.

But because such plans offer greater flexibility, they are more easily adapted to changing conditions. And, because one of the fundamental advantages of the sequential plan lies in the fact that, in most cases, only about half as much inspection time is required as in the use of double sampling, the adoption of sequential analysis deserves consideration.

This, in spite of the fact that the comparative amount of record keeping in single sampling is zero; in double sampling, intermediate; while in sequential, it is *most*. While the sequential plan is harder to explain to the average inspector, all that he really needs to know, about the inspection procedure to be used on the current assignment, can generally be explained in an hour or less.

While standard tables and forms, used in both single and double sampling procedures, give us both the amount of pieces constituting an "inspection lot" and the number of samples to be drawn from each such lot for inspection, the actual amount of parts or pieces drawn for inspection when the sequential plan is used remains undetermined.

Inspection of samples is continued until the cumulated evidence shown in the graph or unit table (as will be shown later in the Summary) is sufficiently strong to warrant either acceptance or rejection of the lot. The term "sufficiently strong," as used, designates the pre-assigned risk of error we wish to assume in making our decision.

Use of Tables and Charts

So our tables and graphs, ("custom built" to cover the specific part) including minor and major characteristic tables, or tables for any set of chosen values, may be compiled. And if the type-of-part, or the inspection procedure is such that they can best be tested in groups of say 25, 50 or 100—tables can be built and used accordingly.

The added burden of record keeping becomes negligible when compared with the value of the analytical information given by a study of a series of control charts. Because, the more information we have on the quality standard of production, the greater the degree of control maintained over the production process, and the easier to establish and maintain high quality.

A seeming disadvantage of sequential analysis lies in the fact that it necessitates compiling our own tables governing sample size as well as the acceptance and rejection quantities. Rather than being a disadvantage, however, this will prove helpful and advantageous by enabling us to decide upon a pre-determined risk of error that will meet the quality requirements of the parts being tested.

In some cases, of course, the sequential plan requires an impractically long series of data before reaching a decision, and there are reasons for curtailing inspection in such cases. On the other hand, evidence from like parts in past lots may prove that risks may safely be modified, thus decreasing the average amount of inspection. However, we are chiefly interested in whether a part is acceptable or unacceptable, and in the safest method of determining such acceptability or non-acceptability at a minimum of inspection cost and time.

In conclusion, the following summary of comparative graphs and unit tables, governing demonstrative phases of the three plans, may aid in clarifying the more important factors involved.

Summary of Three Plans

Fig. 2 consists of 4 graphs, designated as *A*, *B*, *C* and *D*. These are representative of 4 sets of *single*, *double* and *sequential* sampling plans having similar *OC* (operational characteristic curves) and demonstrate the average amount of inspection required under the respective plans, as shown in subsequent graphs. Each plan shows different lot sizes, differing *AQL* (average outgoing quality limits). In single sampling, the entire sample is inspected; in double or sequential sampling, the entire first sample is inspected, and inspection of later samples is curtailed as soon as a decision can be reached.

With graph *A* in mind, refer to Fig. 3, which has an *AQL* (per cent defective) of 5.3% to 6.4%, and an *AOQL* (per cent defective) greater than 11%. This chart, incidentally, is prepared for an unusually small inspection lot of 25 pieces. Using the *single* sampling plan, however, (see table accompanying Fig. 3) our sample would consist of 10 pieces, this amount remaining constant.

The *double* sampling plan calls for a first sample of 7 pieces, and on the verdict reached from their inspection we can accept, reject, or continue with inspection of the lot. If we have but 1 reject, we accept the lot; and if we have 3 or more rejects, we reject the lot. But if we have 2 rejects, we draw a second sample of 14 pieces and if, after inspecting all 21 pieces with a total of not more than 2 rejects, we accept the lot; but if we have 3 or more rejects, we reject the lot.

Using the *sequential* plan, we draw our first sample of 4 pieces and we may accept the lot if there are no defectives among this four, but reject the lot if there are 2 or more defectives. On a lot this small, however, it is advisable to draw a second sample of 4 pieces, making a total of 8. If we find no rejects, we are safe in accepting the lot; but if we have 3 or more defectives, we reject the lot. If, however, we have only 1 or 2 rejects, we draw another sample of 4 pieces (as shown on the table) and continue inspection until 5 sample lots—or a total of 20 pieces—have been drawn. If there are 4 or fewer defectives in this lot of 20, the lot is accepted.

Coupling graph *B*, of Fig. 2 with the graph shown in Fig. 4, we have an *AOQL* (per cent defective) of .90 to 1.5 and an *AQL* (per cent defective) of .32 to .65. This setup covers an inspection lot of from 500 to 800 parts.

Samples and Defectives

As can be seen by the table, accompanying Fig. 4, if the *single* sampling plan is adopted, we draw a first sample of 75 pieces, all of which must be inspected. If we have no more than 1 defective part, in these 75, we accept the entire inspection lot. If we have 2 or more defectives, the lot should be rejected.

On *double* sampling we draw our first sample of 50, and if no defective pieces are found in these 50, we accept the lot; and if there are 3 or more defectives, we reject the lot. But if there are fewer than 3 defectives (either 1 or 2) we draw a second sample of 100 pieces, and if we only find a total of no more than 2 defectives in the total of 150 pieces (the combined quantity constituting our first and second sample) we accept the lot. But, if the test of all samples drawn shows 3 or more defectives, we reject the lot.

In using the *sequential* plan, the procedure shown in the table accompanying Fig. 4 is the drawing of 20 units for inspection, after which we govern our decision for acceptance or rejection of the lot by following the schedule as shown in that table.

Graph *C* of Fig. 2, being coupled with Fig. 5, shows the setup for an inspection lot of from 3,200 to 8,000 pieces having an *AOQL* (per cent defective) of 3.5 to 5.0 and an *AQL* (per cent defective) of 3.2 to 4.4. The procedure of inspection is identical with that previously explained, the respective quantities of samples drawn being governed as shown in the unit table accompanying Fig. 5.

Graph *D* of Fig. 2 is coupled with Fig. 6, and shows a setup for a lot size of from 22,000 to 110,000 having an *AOQL* (per cent defective) of 1.5 to 2.5 and an *AQL* (per cent defective) of 1.2 to 2.2. The rules governing sample, acceptance and rejecting quantities are shown in the table accompanying Fig. 6.

So, as demonstrated by the graph shown in Fig. 2, we learn that the highest amount of sampling, on small lots, is done by the single sampling method wherein the sample lot must remain constant regardless of the quality of the lot. Double sampling, as shown in graph *A* of Fig. 2, is established as being the intermediate for inspection quantity; whereas the least amount of inspection time is required if we adopt the sequential plan.

Further Considerations

It also becomes obvious, from the average amount of inspection for each setup (as shown by the 4 graphs in Fig. 2) that the sequential plan entails the lesser number of parts to be inspected, and that the double sampling plan requires a proportionately higher number of units to be inspected, (as shown in graphs *B*, *C* and *D*) in ratio to a moderate number of rejects. However both the double as well as the sequential plan require less inspection time than the single sampling plan.

As the percentage of rejects increases, however, the double sampling plan will require more inspection than if we use the single sampling plan, but at no time does the sequential plan cross the level of the single sampling plan. Hence, with

Sampling Plans

AOQL (percent defective) 3.5 to 5.0
AQL (percent defective) 3.2 to 4.4

Plan	Sample	Size	Total Samples		
			Size	Acceptance number	Rejection number
Single —·—	First	225	225	14	15
Double – – –	First	150	150	9	24
	Second	300	450	23	24
Sequential ——	First	50	50	1	6
	Second	50	100	3	9
	Third	50	150	7	13
	Fourth	50	200	10	16
	Fifth	50	250	13	19
	Sixth	50	300	16	22
	Seventh	50	350	19	25
	Eighth	50	400	24	25

Operating Characteristic Curves

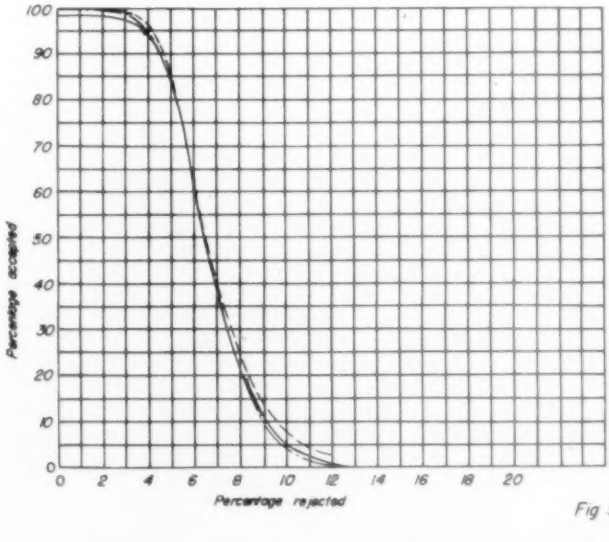


Fig 5

the use of the sequential plan, the burden of inspection is lightened and adequate control of quality is maintained.

While the double sampling plan may exceed the inspection burden of the single sampling plan, we do not incur as great a risk of error as with the use of the single sampling plan. This is fully demonstrated in Fig. 1, of example 3.

A large aircraft manufacturer has used some of the sampling plans, discussed here, with good results. In double sampling, their initial setup was based on Dodge-Romig tables and procedures which were later replaced by a reduced Army Ordnance plan; which, at a still later date, was superseded by sequential analysis. With the use of the latter plan, a great amount of inspection time was saved, particularly so after the quality standard of a supplier had been ascertained from the study of the report cards covering previous shipments. This was especially true in the case of receiving inspection.

Complete Inspection at Auto Plant

On the other hand, a leading automobile manufacturer employs automatic machines and gages, (many of them electrically operated) and finds that the complete inspection is, in most cases, performed as quickly as by previous sampling methods.

This applies to parts where very close tolerance is important and covers one hundred per cent inspection of every main drive gear (where some dimensions are held to a tolerance of 0.0005" or less) to ring grooves in pistons (where four diameters and five widths are checked, some of which must also be held within comparable limits of tolerance) and on valve tappets, where five diameters and two heights are tested.

In addition, there are some important automobile frame dimensions, where 25 gaging blocks simultaneously test the location of all bolt holes in the cross member, side rails and front-suspension mounting plates. This close dimensioning makes it practical to dowel automobile bodies to frames, and to locate fenders accurately on contour lines where fenders must fit closely to the engine hood, radiator grille and the lines of the door.

At Graflex, Inc., where many minute tolerances from which no deviation is permissible are a positive "must," we naturally do a great deal of one hundred per cent inspection and, in most such cases, employ special automatic precision gages (many electrically operated) to do this work. Nevertheless, in order that satisfactorily completed product may move out of the plant as rapidly as possible, we use various sampling procedures and have found double sampling adequate in the testing of some parts while, on others, the sequential plan works out to best advantage.

Sampling Plans

AOQL (percent defective) 1.5 to 2.5
AQL (percent defective) 1.2 to 2.2

Plan	Sample	Size	Total Samples: Size	Acceptance number	Rejection number
Single —·—	First	450	450	14	15
Double – – –	First	300	300	8	26
	Second	600	900	25	26
Sequential ——	First	100	100	0	7
	Second	100	200	4	9
	Third	100	300	6	13
	Fourth	100	400	9	16
	Fifth	100	500	12	19
	Sixth	100	600	15	22
	Seventh	100	700	19	25
	Eighth	100	800	24	25

Operating Characteristic Curves

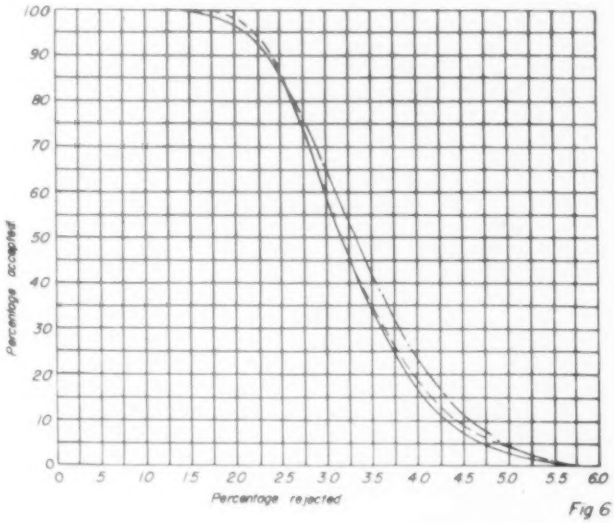


Fig 6

Sub-Title Explained

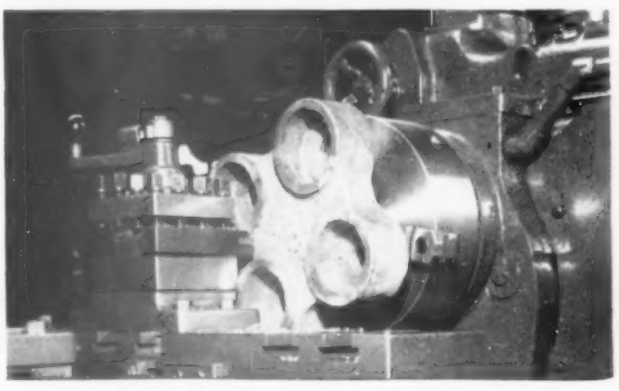
"But," you may ask, "what's all this go to do with the sub-title and its reference to slip ups?"

Only this, that while far it be from the writer to claim the distinction of being the Abou Ben Adhem of inspection and sampling procedures, the reader is assured that, irrespective of what sampling plan you adopt, if you slip up on floor inspection, and defective parts "get away," and no one catches up with them all along the line so that, eventually, they reach final assembly—you can safely bet that Your Slip *Will* Show!

Replaceable Carbide Tool Bits Effect Economies in Production

In line with improvements in carbide tools and holders is a new line of single point tools by the O. K. Tool Company, Shelton, Conn. This tool—which is the first line of replaceable tool bits with brazed-on tips and employing the well known O. K. locking principle—is shown taking an interrupted cut during facing of a cushion head for a foundry vibrator. The part is a steel casting with four bosses, and the cut is ⅛" deep with .012" feed at 308 surface feet per minute—a rather severe test for any carbide tool.

These O. K. tools are designed for quick change when turning, boring or facing; and they are ground for immediate use, and to meet the varying characteristics of the material to be machined. The makers emphasize the simplicity of the holder lock, the rigid design to take the thrusts of high speed operation, the relatively greater amount of carbide available, and ease of regrinding.



By Fred M. Burt

Production of Swing Spout Faucets

A saga of reconversion in which a company, starting from scratch, with a new product, becomes a leading producer inside of seven months

Mr. Burt

THE PATTERN OF ADVANCE planning of plant layout, equipment, materials and process methods at the General Tire and Rubber Company plant at Pasadena*, is one that could well be followed by any company starting from "scratch" with new products to be put into early, large quantity production. The General Tire and Rubber plant had been previously used for production of various war materials; but, with cessation of this demand, several products of differing designs were exhaustively studied and considered for peacetime manufacture. Quantity marketability, plus suitability for manufacture in this 40,000 sq. ft. building, were prime factors in this consideration.

Swing spout kitchen faucets, in two major types, were selected as the original product of manufacture although, in the Engineering and Experimental Departments, research is maintained by competent and imaginative engineers to develop other suitable products for the plant.

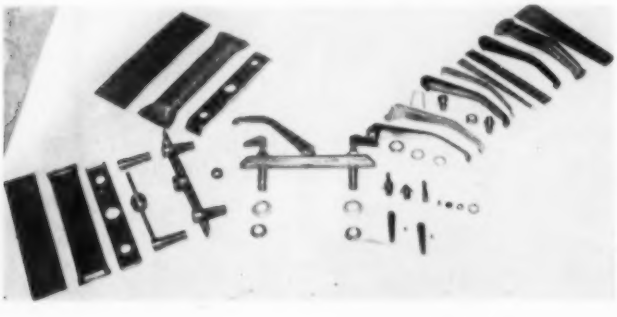
Designated as the Commodore Line, these faucets are the Model 502 Ledge Type, shown in Fig. 1; the Model 501 (which is the Model 502 with the addition of an Autospray attachment for rinsing dishes, having a molded plastic sprayhead), shown in Figs. 2 and 3; and the Model 508 Wall Type, Fig. 4. They are made from brass stamping, brass tubing, and precision-machined brass fittings. These are subassembled and permanently silver-brazed, then sanded, buffed, polished, cleaned and chromium-plated.

Production started in February, 1946, with a key personnel of young men, many of whom had been in positions of major responsibility at the California Institute of Technology during the war. Within seven months, the plant became the largest manufacturer of kitchen faucets in the United States, and therefore in the world. By December 1946, 5,000 completed units per day were coming off the production line, with a large production increase scheduled for early 1947.

The highly mechanized, closely controlled production system, with progressive inspections and tests, has a large number of its operations tied together in synchronous flow. All of the other production operations are at stations, or machines as a part of this continuous process, with only the breaks that come from building up specified-number banks of workpieces, between operations.

*General Tire & Rubber Company's Commercial Division in Pasadena is a high speed production unit with a maximum of mechanization for silver brazing, buffing, polishing, and plating; and all operations are under close control.

FIG. 1. Model 502 Ledge Type Faucet assembly in center. At upper left, the case; at lower left, the base. Running diagonally, upper right to center, progressive development of the swing spout. Lower center and lower right, small, precision-machined fittings after chromium plating.



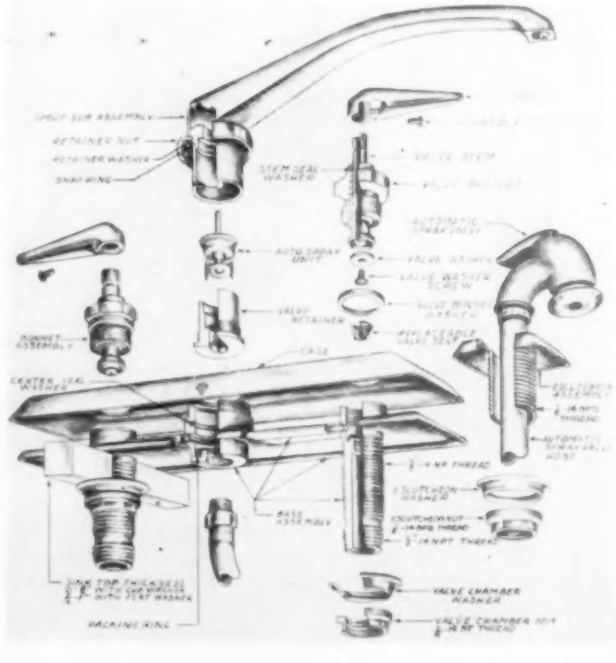
High Quality With Progressive Tooling.

With the output finally leveled at a daily quantity that allows and justifies further efficiency refinements, *more or less* permanent production procedures have been set up, with the layout of tooling and other equipment adhering to a more constant pattern. The qualifying "more or less" was inserted for the reason that the only absolute constant is the certainty of change any time that Process Engineer Weinland, together with management and other engineers and department heads find need for it.

There is a prevailing atmosphere of wanting to find the "best way to do the job." In effecting frequent improvements, however, care is taken that they shall not interrupt production. The 400 employees work five, 8-hour days per week, about 300 of them on the day shift, with the rest on other shifts on certain processes. This allows for week-end changeovers.

The scheduled continuity of production could not be maintained if supply or process bottlenecks were allowed to develop. This puts a heavy responsibility on Procurement, the Materials Control Section—which handles stores—and Receiving and Shipping, respectively in charge of John R. Chaffin, Herb Bree and R. J. Hier. Sharing this responsibility is Production Scheduling and Production Control, under Howell White; and Inspection, which is under Chief Inspector Robert Leard. No part, sub-assembly or assembly, showing any defect in material or workmanship, may progress

FIG. 2. The Model 501 Ledge Type Swing Spout with auto spray. All component parts are shown in their relation to each other.



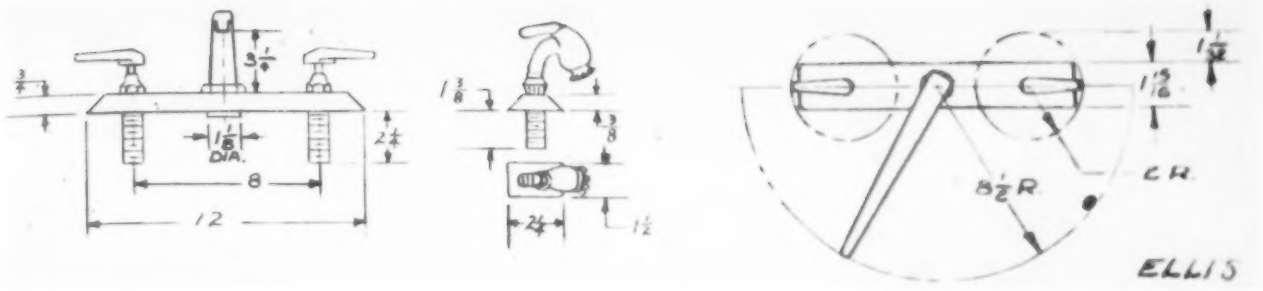


FIG. 3. Installation sketch of the Model 501 Ledge Type.

without immediate re-work, correction or rejection, as the case may be.

An Administrative Committee, composed of Trevor Gardner, Al Acker and W. R. McIntire—respectively general manager, works manager and sales manager—make up quarterly production schedules well in advance. These are broken down, by Production Control, into monthly, weekly and daily production requirements. The schedules established are followed, except for revisions issued from time to time, and which became necessary since, pre-estimated quarterly schedules can be only approximately correct.

However, the quarterly schedules are sufficiently accurate for Procurement to plan and make commitments for at least 90 days on supplies for all major manufacturing needs. These are divided as follows:

(1) Raw materials, consisting of strip brass, brass rod and brass tubing—over 400 tons monthly.

(2) Screw machine products—as brass fittings—from outside contractors. Blanket orders for at least one month supply of these parts are given to the manufacturers. Maximum and minimum delivery schedules are specified; subject, however, to revision as future conditions may dictate.

(3) Purchased parts such as Neoprene O-rings, silver alloy wire and other components, and

(4) Such operating supplies as buffs, compounds, plating supplies, maintenance and office supplies.

Quantities of outside production and purchased parts are determined by Production Control and are transmitted to Procurement on Material requisitions. Operating supplies are kept available, under perpetual inventory, in two adjacent storage lots and in two nearby warehouses. They are fed to points of use only as needed by Materials Control, which also controls Transportation. This keeps valuable operating space free from any storages other than those required for current use.

FIG. 4. Manufacturing progressive and sub-assemblies of Model 508 Wall Type Swing Spout Faucet. The completed unit is shown at upper left.

Most of the materials and parts, in plant and storage areas, are handled on pallets with specially-designed and standard-sized wooden cases, wire baskets and trays, sheet iron tote boxes; and other containers for the smaller units. These are lifted and transported by three powered Clark Fork Lifts and two hand fork lifts.

Cases, and case bases are made of 16 gauge strip brass, delivered in rolls. In producing the Model 502 cases, the rolls are mounted on a reel, and the strip is fed into a small punch press with a shear blade and a stop. It has foot-pedal operation and a Redington counter to record the number of cuts made. These counters are used throughout all manufacturing operations, where they can be applied to supply information to record on the "Daily Production Report" form which is used in all departments. Other operations records are taken from counts of standard containers.

These strips, mentioned above, are quickly formed, trimmed, and pierced in a 350-ton Clearing Hydraulic Press (Fig. 5) with a double die and two operators. No. 502 case bases and No. 508 cases and bases are similarly sheared and formed, trimmed and pierced on punch presses. See Fig. 6.

In the brazing line for No. 502 bases, a sub-assembly is made of the support bushing in the center and valve chambers on each end, with two tubes running to them from the support bushing. Little rings of Handy and Harman "Easy-Flo" silver alloy (50% silver) are positioned around the four ends of the tubes. A stop pin is inserted and the assembly is then placed in a holding fixture, the case base is added and "staked" to the assembly by a blow from a manually operated ram. Then flux is painted on at the areas of brazing jointure.

This work is done at four stations, two on each side of the assembly bench. Assembled units are hung on wire hangers suspended from a Richards-Wilcox Zig-Zag conveyor chain which travels over the center of the bench. This carries the bases to the two operators of eight brazing furnaces. See Fig. 7.

FIG. 5. Forming Model 502 case on 350-ton Clearing Press. The part is passed to an operator on the opposite side of the press, who turns and pierces. Thus the part is formed, trimmed, and pierced at one stroke.

FIG. 6. Punching three holes in a formed case base on a punch press.

The flux used here, and on all other of the five brazing operations, is Handy and Hárman fluoride paste type, soluble in water, and mixed to the consistencies found to be best for application. As the silver alloy becomes fluid at 1175° F., the flux is also a low temperature constituent, beginning to fuse at 800° and starting to dissolve oxides. At 1100° F. it becomes completely liquid and active, fully dissolving oxides and acting as a cleaning agent.

The brazing operators remove the bases from the conveyor with special forks to place them in the small furnace units. Each of these is heated with three natural gas burners having ceramic brazing tips. The proper gas-air pressure and pre-mix comes from a 900 cfm Selas mixer-compressor unit.

The blue flame from the tips bathes each of the localized areas where the silver alloy rings are to be made fluid, so that they may flow into, and completely and permanently seal the circular interstices between the parts to be joined. Each operator carries a little roll of the silver alloy wire on his left arm and uses small quantities of it where needed for production brazing or for re-work.

Immersion Leakage Tests

When the operator's trained eye determines that the brazing is completed, the fork is again used to place the brazed unit on the conveyor which carries it, in three dips, through a boiling water rinse to remove flux, a mild hot sulphuric acid bath to remove scale and oxide, and another boiling water rinse. They are then carried to a machine in which they are clamped and immersed in water for leakage testing with compressed air. Those that show leakage are routed back for re-work and others are then ready for buffing and polishing. Another, similar line (Fig. 8) is used for brazing Model 508 case bases.

FIG. 8. Model 508 base brazing line. Lower left, assembly and flux application, then placement on Zig-Zag conveyor running over center of table. Lower right, end of row of eight brazing furnaces with line carrying brazed units around to rinse and acid baths.

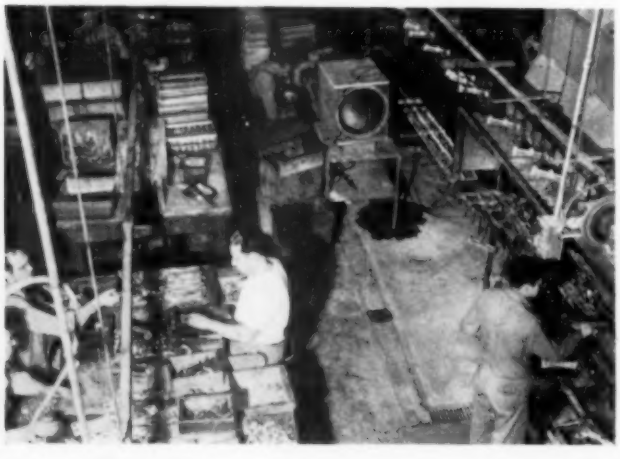


FIG. 7. Short continuous base for silver brazing Model 508 eccentrics. Operator at left applies flux, silver alloy ring, and assembles parts. The moving line carries the parts past five gas brazing units. Brazing time 35 seconds, or about 600 per hour for the five units. The brazed parts drop into a basket, for dip into mild sulphuric acid bath. They are then rinsed in adjacent hot water bath. Operator at right applies leakage test. In right background, lead operator is applying leakage test for Model 502 line.

The sub-sub-assembly of the No. 502 spout is made up of the spout top and the spout throat. They are each blanked out, stamped, trimmed and pierced on punch presses; also staked on a compressed-air operated staking machine, with any deformation restored on an adjacent "spanker." At the starting point on the Zig-Zag conveyor, spout-brazing line, an operator places the throat in the top and stakes them together, as shown in Fig. 9.

They are then handed to the next work station on the long assembly bench where a pre-formed shaped piece of silver alloy wire is inserted in the larger end. Its size, shape, and exact position of placement have been calculated so that, when in the brazing furnace, the silver alloy (when it becomes fluid) will flow along the edges of the two parts, soldering them tightly together. The pivot bushing—made up of two screw machine products swaged together—is also inserted, along with a little silver alloy ring.

At the next bench station—which is another air-cylinder operated machine—the sub-assemblies are placed in a wiping

FIG. 9. Operator at left is staking together tops and throats of Model 502. Next, man is inserting silver alloy in pre-formed wire units, also the pivot bushing. Third operator compresses for tight fit in wiping die, and hangs unit on conveyor hanger. Beyond him, on table, Model 508 round spouts are assembled for brazing in eight-furnace unit along wall in far background. Round spouts are carried down into flux tank in background and around to brazing furnaces at right. Line carries both types of spouts to leakage testing units—one for Model 502 spouts in foreground.

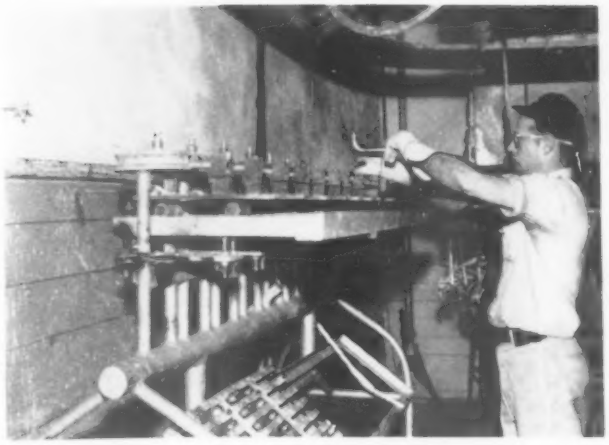


FIG. 10. Round spout brazing operator takes spouts from 24 unit capacity case, below, and places on small wheeled carriers to push them back into brazing flame.

or compression die, which includes a tight fit around the pivot bushing. Then the sub-assemblies are placed on a conveyor hanger which carries them for a dip into a flux bath, after which they are carried to points parallel to the four spout-brazing furnaces, each with a 4-spout capacity.

Model 508 spouts, made of brass tubing, are sub-assembled, with flux application for brazing, on a bench opposite the flux bath. They are brazed in the nearby 8-spout capacity brazing furnace, located along the wall just outside the conveyor carrying the Model 502 spouts. See Fig. 10. This line also carries them to the leakage test which, for three days of the week, is not in use for the No. 502 spouts. During these three days the crew operates the No. 502 case base brazing line.

The No. 502 spout brazing operators work from the sides opposite the conveyor line. Inside the line, a service operator removes the spouts from the conveyor and places them, four at a time, on the holding fixtures of the furnaces when the brazing operator raises the heavy, sheet steel furnace hood, as shown in Fig. 11. This fits over the burners, to confine the heat during the brazing, and is raised and lowered with a counterbalanced side lever.

When ready for brazing, the hot gas flame is projected from burners, on each side of the spout, to play evenly along the edges to be soldered together, and on the pivot bushing. When the brazing is completed, the hood is again lifted, the spouts are removed and replaced on the conveyor hangers to be carried through the hot water, sulphuric acid and hot water baths, and then to a 60 psi compressed air leakage test.

FIG. 12. Continuous polishing machine. Bottoms of Model 508 cases being polished at 20 per minute. Note hose attachments for spraying of compound on polishing wheels.

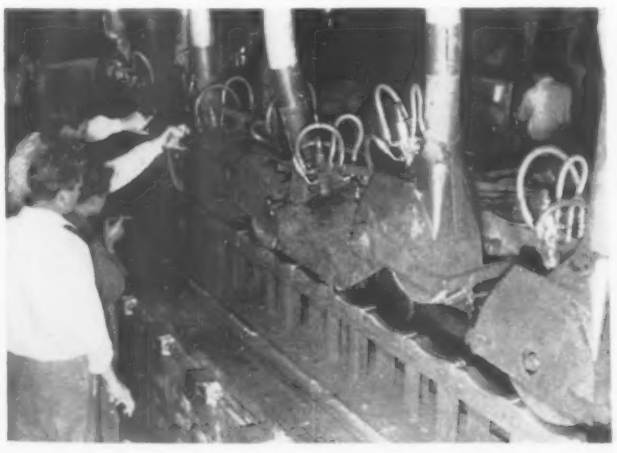


FIG. 11. One of four Model 502 spout brazing furnaces with hood lifted for insertion of four spouts in holding fixtures. Brazing operator (in rear) is ready to lower hood and apply flame.

After brazing and testing, all units move to the sanding, polishing and buffing lines. The under side of the larger end of the No. 502 pivot bushing is machined on a spot-facer. The spout is then rough-sanded and the ends ground on a soft stone wheel. Just beyond this short line there is an automatic, continuous polishing machine used principally for No. 508 cases. It has eight polishing wheels, with a capacity to polish one side of 20 cases per minute. See Fig. 12.

Electric Eye Promotes Safety

At the loading end, the feeder slips a case over each block as the chain brings it up, on return travel. The blocks are first affixed in the position to polish the case bottom. After a set number of several thousand are polished, the blocks are changed to run them for face polishing, and then for top polishing. Each block is held in place with a single wing nut.

The operator at the other end of the line (who removes polished cases) has his hands protected from straying to the dangerous lower, return level by an "electric eye" beam which, if broken, stops the chain. There is also an emergency stop switch at each end of the machine.

Each wheel has its own push-button control, so that they can be stopped and changed, one at a time, without stopping the production operation. A liquid buffing compound (Nu-Spra-Glu) is fed to all wheels automatically at the same time from overhead, individual spray heads, supplied from a 10-gal. pressure vessel (air at 7 psi). The spraying is actuated by a cam, on the conveyor chain, with a frequency calculated to keep the wheels properly loaded.

FIG. 13. Rotary machine continuously polishing No. 508 escutcheons at about 10 per minute.

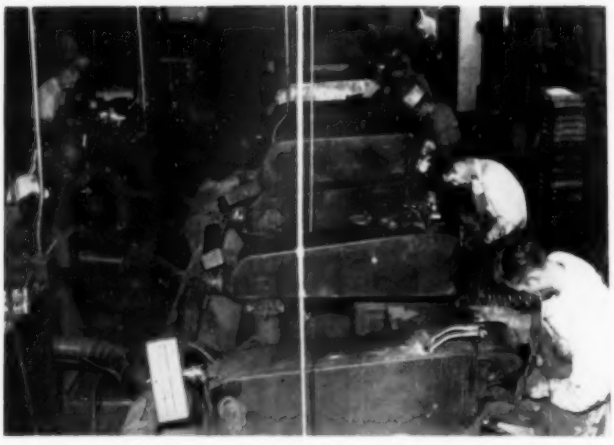


FIG. 14. Grease-polishing in line at right, buffing in line at left. Note well-hooded wheels with ducts leading to 12,000 cfm blower.

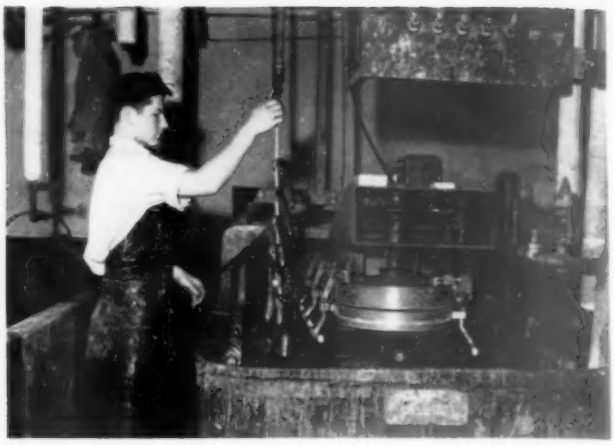


FIG. 15. Nickel plating tank with Crown semi-automatic plating machine operating on a six minute plating cycle.

Just beyond this machine there are two automatic, rotary polishing machines; one, with six rotating spindles, for the polishing of No. 508 escutcheons. See Fig. 13. The other, with eight spindles, is used for small machined parts. All of the sanding and polishing units in this line are well-hooded, with the dust particles drawn away in ducts leading to a 36-in., 12,000 cfm capacity blower powered with a 40-hp motor. A similar blower is at the end of the ducts leading from the parallel, nearby double line of sanding belts and polishing wheels.

Grease polishing (Fig. 14) is done on five polishing lathes with backstand idlers, each equipped with two belts. Two of these machines are R2VM 2-spindle, variable speed Standard Electrical Tool Company units; two, are Chas. F. L'Hommedieu lathes; and one, a Rite Speed Hammond. Belts used are Behr-Manning 220 grit, 4 inch wide x 118 inches long sanding belts running at 10,000 fpm. In operation, grease cake (which contains about 5% emery) is rubbed on the belts to lubricate them and to prevent overheating.

In a parallel line—comprising six buffing lathes (five Hammond Rite Speeds, one L'Hommedieu), each with two wheels—polishing is done with cloth wheels and tripoli compound. On these machines, a competent operator will buff a thousand spouts in one shift. Two men serve the polishing and buffing lines, bringing work to the 30 operators and taking it away. Five inspectors maintain a line inspection to examine each box of parts for acceptance, or immediate re-work.

Containers of accepted parts are taken directly to the nearby plating department, where one man loads them into metal trays for vapor degreasing before racking for plating. A rail runs above the degreaser tank, carrying a 100-lb. air hoist which lifts the loaded trays to be dropped into the tank for a one to three minute degreasing, then lifts them out for unloading.

This unit, however, is to be replaced by a conveyorized unit made by Industrial Systems, Inc., Los Angeles. This will have two overhead conveyor lines running at a convenient loading level, along the buffing and polishing lines, and will carry work baskets. As the baskets move into the plating department, they will mount to an upper level spraying chamber, where the workpieces will be sprayed with perchlorethylene, at 120° F., for the removal of the polishing compound. Then, through an enclosed duct to a custom built, Veco vapor degreaser for final cleaning before delivery to the sorting table. From here, the baskets travel back to the polishing room.

At two parallel racking tables, one man supplies nine "rackers"—as these operators are called—who mount the parts to be plated on a variety of copper racking fixtures designed to suit the different parts. These fixtures are protected by ten coats of Unichrome lacquer. After the first coat is applied by dipping, they are baked for 30 minutes, then the next eight coats are air dried and the tenth coat is baked for eight hours.

After the parts are wiped with flannel cloths and racked, they are hung on a revolvable wheel at the end of the first tank in the plating room. With recent production-increasing changes—resulting from the addition of new tanks and an

FIG. 16. High speed copper strike tank. Bars, on which work racks hang, shuttle back and forth to give a proper agitation, driven in unison by a motor-lever arrangement.

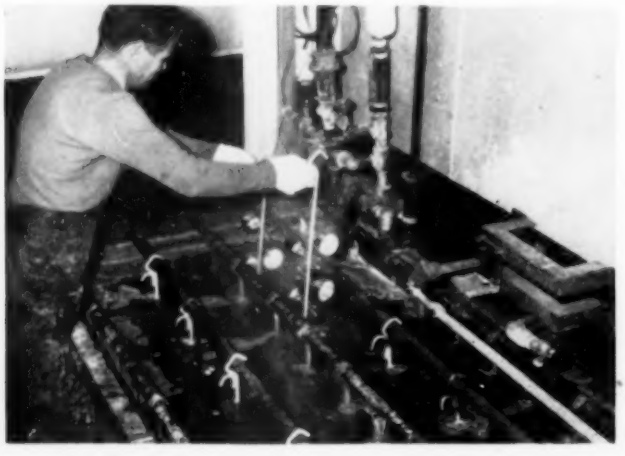


FIG. 17. One of the after-plating, unloading and inspection tables. Inspection Foreman at left. Note empty racks with chrome deposits on tips. These will be cleaned in the chrome strip tank before re-using.

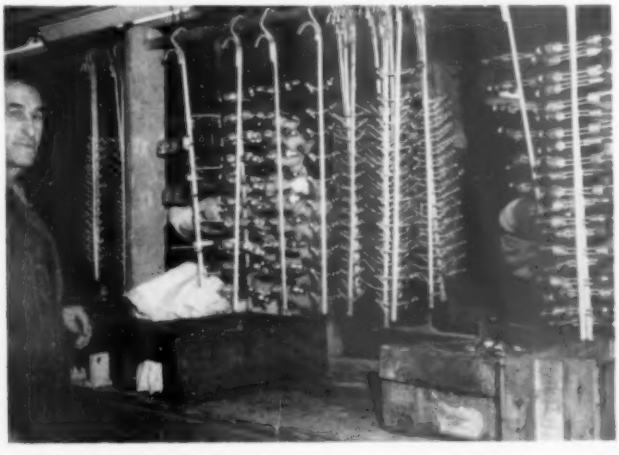


FIG. 18. No. 508 continuous case inspection line with assembly in background. At left, assembly of swing spout bases, Model 502.

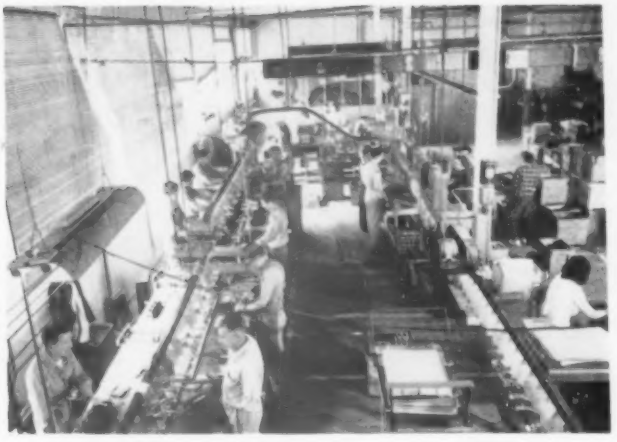


FIG. 19. Final assembly, leakage testing and inspection-rework line for Model 502. Lower right, inspected units removed from line for packing.

additional plating line—line No. 1 is for the plating of brass parts, drawn and machined. Line No. 2 is for the No. 508 escutcheons and handles for both units, the latter die cast from zinc base alloy (Zemac).

Cleaning and Plating

Following through on line No. 1, the parts first go into "soak clean," tank 1, for a 30-second immersion in Oakite No. 24 alkaline cleaner, heated by steam pipe coils and thermostatically controlled at 180° F. Then into tanks 2 through 19, for operations as follows:

2. "In-and-out," cold flowing water rinse.
3. 30-second "Electroclean," alkaline Oakite plating cleaner; with 6-volt, dc reverse current positive on the work tank as cathode.
4. "In-and-out," cold water rinse.
5. "In-and-out" 10% sulphuric acid bath; cold.
6. "In-and-out" water rinse, to remove acid carry-over.
7. 10-second, copper strike; a copper cyanide, sodium cyanide, caustic soda bath; 6-volt current, with work as cathode.
8. Water rinse.
9. 1% sulphuric acid, cold; rinse to neutralize.
10. Water rinse.
11. Nickel Plating. This 1900-gal. tank (Fig. 15) has a Crown, semi-automatic plating machine to handle the work in a six minute plating travel. A Harshaw Bright Nickel plating solution, at 130° F. controlled heat, is used to build up a minimum of .005" coating of nickel. The solution is analyzed twice weekly for nickel salt, nickel chloride, boric acid and brightener, with additions then made to maintain standard strength. As a regular control practice, all solutions in this department are given a twice weekly analysis.
12. Dip in nickel salvage tank to remove the nickel solution carry-over, used in replenishing the solution.
13. Cold water rinse.
14. Rinse of 10% cold sulphuric acid.
15. Water rinse.
16. Chrome plating, 30 seconds. In this 600-gal. tank a minimum coating of .0001" is applied. The solution is made up of 40 oz. of chromic acid and .40 oz. of sulphuric acid per gallon of water.
17. Water rinse for carry-over salvage.
18. Water rinse.
19. Hot water rinse, just under boiling; after which the racks of parts are hung above the unloading and inspection tables.

Defective parts go to the chrome strip tank for a 30-sec. bath in an Oakite No. 90 solution at 180 degrees, using a reverse current with the positive on the parts; then, they are rinsed and ready for nickel stripping. The racks, also, are all taken to this strip tank to remove the chrome deposits on the tips before they are again loaded.

The die cast parts start in the second line and progress through a 30-sec. Electroclean, Kelite anodyne alkaline cleaner at 180 degrees; with a forward, 6-volt dc current; parts cathodic. Then, through tanks 4, 5, 6, 7, 8, 9, and 10 (same as in line No. 1); then, in turn, through eleven tanks, as follows:

11. 30-sec. high speed copper at 170 degrees, using a Du Pont potassium high speed copper plating solution. See Fig. 16.
12. Water rinse, for salvage of copper plating solution carry-over.
13. Water rinse.
14. Dip in 10% cold sulphuric acid.
15. Water rinse.
16. Nickel plating using the Harshaw Solution and equipped with a Udylite, semi-automatic plating machine.
17. Water rinse, for nickel plating solution carry-over salvage.
18. Water rinse.
19. Rinse in cold sulphuric acid, 10%.
20. Water rinse.
21. Chrome plating, a duplicate in solution and operation of the one in line No. 1.

Then, through tanks 17, 18 and 19 of line No. 1.

Final Operations

After the chromium plating is removed from defective parts in the chrome strip, nickel plating is removed in the 30-sec. nickel strip bath of 60% sulphuric acid, cold, in water; with a 6-volt, dc reverse current.

The No. 502 case bases are given only a nickel plating as they are concealed underneath the base in final assembly. They receive the same Electroclean bath as in line No. 1: followed by rinse; 10% sulphuric acid bath; rinse; and then a nickel strike, using the Watts Nickel Solution; a salvage bath and final rinse; followed by inspection; and then transportation to assembly where they join all of the other plated parts. See Fig. 17.

Final inspection and assembly—Figs. 18 and 19—is continuous at several work stations. After final assembly the units travel on a conveyor line for leakage tests under high water pressure. Then, installation fixtures are packaged with them after wrapping, followed by packing in cartons ready for shipment.

By Walter J. Brooking

Formal Education for Tool Engineers

In Which a Modern Factory Becomes an Educational Laboratory for Practical and Technical Training

ONE FACTOR in modern manufacturing which is often unrecognized, yet highly important and quite vital to our American way of living, is the need for personnel who have been trained by blending manual skills and formalized education to give them the necessary background for high caliber industrial leadership and effective direction of production.

***Walter J. Brooking*—previously introduced to readers of *The Tool Engineer* by his article, "Tooling for Arc Welded Production" in the October, '46 issue—is a graduate of Whitman College, Walla Walla, Wash., and the University of Chicago. Joining LeTourneau, Peoria, Ill., in '35, he was assigned to time study, later to the engineering div'n where he was successively promoted until in '43, he became Director of Testing & Research. Member of A.S.T.E. and of the American Welding Society, he is also author of numerous articles, as well as a book, "Arc Welding, Engineering and Production Control." At present, Mr. Brooking is Dean, LeTourneau Technical Institute of Texas, Longview, Texas.**

These men are variously known as Tool Engineers, Production Superintendents, Production Foremen, Toolroom Supervisors, Toolroom Foremen, Head of Planning Departments, Methods Engineers, and by various other titles, each of which describes the function performed by these essential key men of industry. For the purpose of this discussion, however, men who are responsible for the foregoing listed functions, or who perform a part of them, will be considered Tool Engineers.

The extent to which modern industry depends upon these men is greater than commonly recognized. They generally represent the trained mechanics, skilled technicians and modern mass-production specialists who translate the originally designed product, from the official engineering department into a repetitively produced flow of finished equipment rolling out of factories in the characteristic American production way.

It is they who do the essential planning, who design and build production tools and fixtures, who install, test and try them out, who supervise their use during production, and also maintain them throughout the productive life of the tooling for a given model or piece of equipment. They constitute the essential engineering, technical, and trained technician staff who project the plans of the product designer into the reality of mass production.

Ample opportunity for advanced students to study the engineering and tooling associated with welding is exemplified by this setting up and welding fixture.

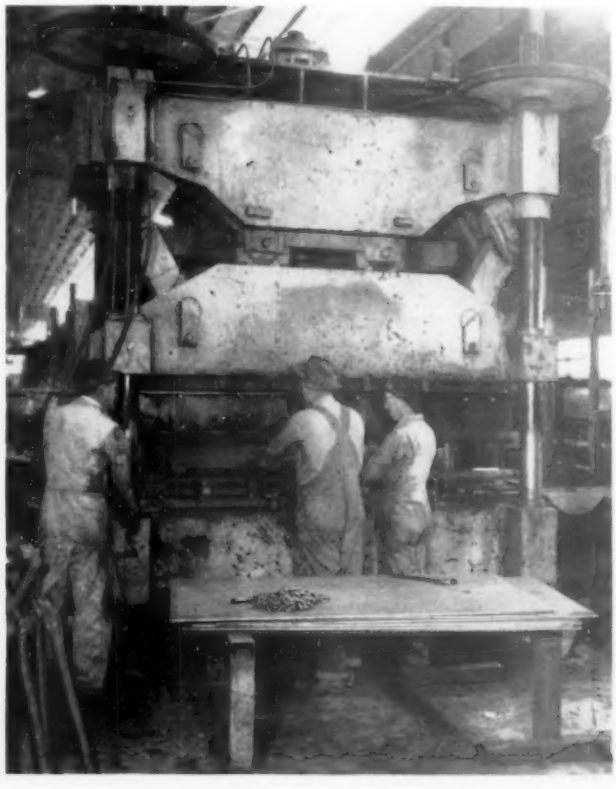
Important Qualities of a Tool Engineer

Whatever may be his title, the man at the head of a modern production department has certain characteristics of background, experience, education, and capability which, in varying degrees, are shared by all of his assistants. Among the characteristics which he exhibits are:

1. He is first of all a capable and experienced mechanic who knows the practical phases of modern mass production. Usually, he has learned his profession from the ground up as a machine operator, and by several years of practical experience in operation and manufacturing.

2. He has gained—through study of the job, by correspondence courses, by reading trade literature, or

The designing and building of metal shaping and forming dies for welded structures is also provided for students with a special tool engineering interest. Not only the dies, for the shaping of these metal parts, but the entire press itself, is LeTourneau built.



by formal school study—a working knowledge of the technical information associated with some one or more fields of production.

3. He has learned the basic principles of the economic factors associated with production, and takes advantage—to the extent of his knowledge and facilities available to him—of the favorable economic factors in mass mechanized manufacture.

4. He has some understanding of product design, a broad knowledge of tooling for mass production, and a general knowledge of mass production principles learned from a combination of experience, personal resourcefulness, and study of his work.

5. He has not, however, generally speaking, attained his position of Tool Engineer or production specialist by virtue of a well planned and orderly formal education in school.

Because of the important role which mechanized production now plays, and will increasingly play in modern America's manufacture of metal products, and because of the need for a better method of training capable mechanics, engineers, and managers, the LeTourneau Technical Institute of Texas, working with the R. G. LeTourneau Corporation's large new manufacturing plant at Longview, Texas, have established a unique and original plan for the training of Tool Engineers and Production Specialists.

A full-time staff, of six instructors, is currently employed by the LeTourneau Technical Institute to train students, now enrolled in the school, in the principles of practical machine work and tool engineering. It is anticipated that three times the present number of students will eventually be enrolled in tool engineering, with a consequent larger staff of instructors and specialists. This does not include instructors in metallurgy, chemistry, physics, and other allied subjects.

The LeTourneau Technical Institute of Texas works in close cooperation with the R. G. LeTourneau Corporation to provide a highly effective, and closely correlated cooperative educational experience.

Schooling Saves Time

This plan is designed to include the essential elements of study and experience which have contributed to the success of mechanized production specialists and, at the same time, to provide them with formal technical education in a *more orderly and more efficient (from the standpoint of elapsed time)* program than the one by which most such men obtain their education.

Basically, the LeTourneau Technical Institute's plan is to provide an orderly classroom study—science, theory, and associated information on mass production and mechanizing —for the students at the college level, for a half of each student's school day; and also to provide actual work experience as a machine operator and mechanic, in the LeTourneau Company's Factory nearby, under the guidance of a full-time Institute instructor during the other half of each day.

As an economic measure—to encourage the student and to increase the value and reality of his study—the student is paid by the Company at a rate commensurate with his skill as a beginner. His rate of pay is progressively increased during the course while he is a part-time employee in the LeTourneau Company's factory, as well as while he is a full-time student at the regular Institute.

The Factory as an Educational Laboratory

The LeTourneau Corporation's large new factory, built to produce a new line of heavy earthmoving equipment and concrete house building forms, is an all welded steel and aluminum factory building, 310 feet wide by 1000 feet long, and is devoted to arc welded manufacture of heavy machinery.

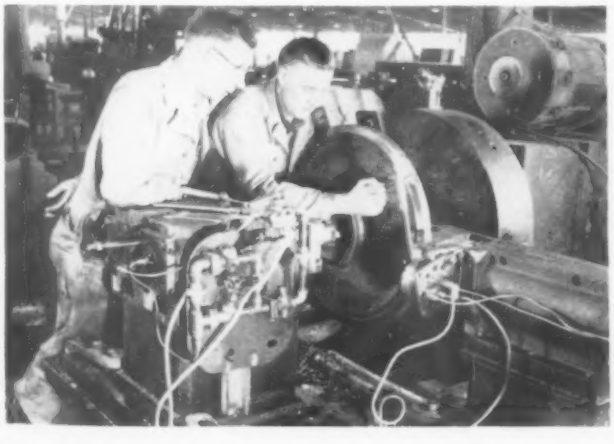
The entire Longview, Texas, plant has been erected and fabricated by arc welding and, to a large extent, all of the equipment for storage, transportation, and handling are designed on the spot and fabricated in the plant. Production jigs and fixtures, and tooling for the fabrication of the company's main product also are a part of the work done in the plant, even to the extent of building semi-automatic lathes for the production of finished welded machine elements.

The student commences his work in the factory as an unskilled machinist apprentice. After the initial three weeks of "vestibule" training, he devotes the larger portion of the first few months of his factory time to being a machine operator. As soon as he becomes sufficiently adept to enable him to do so, he is allowed to set up his own work under the guidance of an instructor.

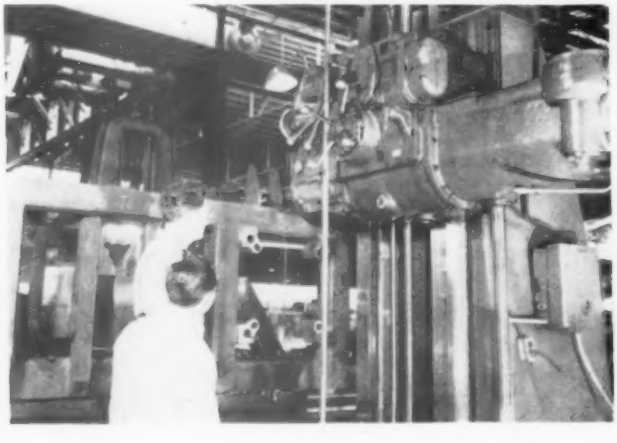
This enables him to begin to understand the importance of such factors in tool and production engineering as standardization of parts, the mechanics of jig and tool building, the manipulation of jigs and fixtures and, as a basis for intelligent criticism and suggestion for design, he has an over-all opportunity to observe what is being done around him in the factory, especially in tooling, planning, and production.

This basic information is provided continuously as a part of his factory training throughout his tenure in the school, and differs from the usual apprentice experience in a factory, in that at LeTourneau he has a full-time instructor with him who helps to point out various elements which are normally less clearly defined to the apprentice or usual workman in a plant.

Students at LeTourneau Technical Institute actively assist in tooling, and tool engineering for the production of manufactured parts. Not only the tooling, but the entire semi-automatic lathe, in this instance, were engineered and built in the LeTourneau organization.



By operating this large Giddings and Lewis boring mill, students have an opportunity to do special machine work, such as facing the stops on this special fixture, as a part of their school experience.



Advantages of Combination Program

The combined part-time employment and school instruction time spent in the factory, where the student gets actual experience with pay for the hours spent, and at the same time gets formal instruction which provides five semester hours of school work per eighteen weeks semester, presents certain advantages as follows:

1. The production machinery used in this large manufacturing plant, including some 400 welding machines of various types and over 350 machine tools, provides a variety of working facilities and equipment which far exceeds that possible in the usual vocational school laboratory. The variety in size of machine tools, from sensitive drills to $50,000 boring mills, and the variety of work done on the machines, provide an almost ideal learning situation for the students.

2. The laboratory work is an actual employment experience, in which the student works on genuine productive work, for which he is being paid, and the results of which he can see as something useful and contributing to a definite manufacturing program. They are not pre-planned laboratory exercises, the educational value of which is often depreciated as a result of destroying the material used; and the "make-work" aspects of which often reduce the incentive required, for the most effective learning process.

3. As a work experience, the time in the laboratory may be used as a credential, by the student, when he seeks employment on the basis of actual work experience. This is a real advantage to the student, because the LeTourneau Company's industrial employment records show him as a part-time employee,. thereby strengthening his position when he applies for full-time employment.

4. Fundamental economies, in both the use of time and effort, favor the students in this plan, because part-time employment is in work which is the same as the student's major educational objective. The part-time employment, so often available to high school and college students, consumes time; but it usually does not contribute directly to the student's major educational objective; as, for example, students working in soda fountains, cafeterias, waiting on tables, or similar "sustaining" employment.

5. This plan provides a liberal degree of timely industrial employment experience while the students are in the plant. It should be understood that while they are essentially under the full-time guidance of a trained instructor whose function is to teach, they are also under the supervision of an industrial foreman who cooperates very closely with the instructor.

6. The plan also favors the student, in that he is paid for the time he spends in the laboratory. This allows him to pay part of his expenses while he is educating himself, by turning his "practice effort" into useful and productive channels. It is, therefore, fundamentally a more economical use of student time as well as industry's materials and mechanical facilities, and therefore provides a constant lesson in basic economy to the student.

Major Interests Determine Curriculum

The work which the student does in the plant is assigned on the basis of the student's major interest, (machining, welding, mechanical maintenance, and so forth) and the length of time which he spends on each individual assignment in the shop depends upon the educational value of the work he does, in the light of a realistic evaluation of industrial experience.

The work which is carried out in the classroom, during the other half of the same day, includes subjects related to his major work. It includes courses in language, mathematics, mechanical drawing, metallurgy, and others, applied to the work he does in the plant. Citizenship and government, as well as physiology and hygiene are also taught to academy level students on practically the same basis as in a public high school with a vocational course; and they are also presented—on the institute or college level—as they would be taught in a college classroom or laboratory program.

The course of factory experience and classroom instruction is comprehensive enough to give the student the "tools" of language, mathematics, and technical science to provide from 27 to 36 months, or the equivalent of three to four years of school work.

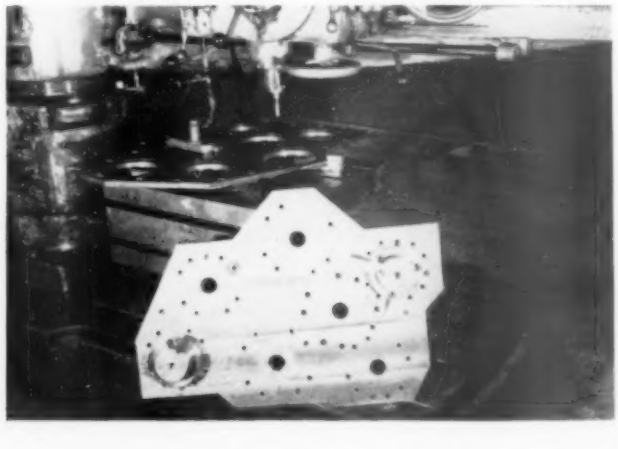
The LeTourneau Technical Institute began its course of instruction only six months ago, and it has already received college level recognition by the Texas State Department of Education and the American Association of Junior Colleges.

Underlying Educational Philosophy

The objective of this plan of education is strongly utilitarian; namely, to make the recipient of the program capable of competing successfully for well paid employment, and to foster continued growth in leadership at the end of the training program. It is *not* a program of "operator training," but one of the *education* of a professional mechanic. It is directed toward the education of mechanics, technicians, and craftsmen, in the application of efficient and scientific processing in today's mechanical age—in other words, it is aimed to fill a definite and widespread need which has long been felt for this particular type of education.

Practical use of the Mechanical Drawing studied in classrooms is made in the tool engineering department where actual shop problems in tooling are solved.

Not only the design of drilling jigs such as this, but the actual making, checking, and use of these jigs is a part of the student's experience.



The educational heritage of our country has been largely the Liberal Arts Colleges and Universities, being supplemented by the professional schools. The fundamental objective of a Liberal Arts education is the appreciation of culture. There is no question but that it has served well, and will continue to serve our nation as an educational system. Our level of literacy is among the highest on earth, and our nation has grown and flourished. With our country's vanishing physical frontiers and greater population, however, the trend towards competitive production of consumer goods and the concomitant development of mechanized mass production, has become one of the most important of new frontiers.

Contributions of the nation's mechanics, technicians, and highly skilled production men, to our present American way of living should not be underestimated. It is they—through the machines they have made—who have lifted the burden of labor from the shoulders of the American people so that we have the highest standard of living and the shortest work day of any people on the earth. Our technical men share this contribution with the professionally trained artist and scientist; but to technicians go the greater share of the honors.

By the same token, the machines which they have created have produced more of the wealth which, in turn, has made it possible to support the Liberal Arts system of education of our nation. Yet these same mechanics, technicians, and skilled production men probably receive the least direct benefit from the Liberal Arts education program. This is largely because they, as a group, are probably less "abstract minded" than those who are most interested, and who successfully complete programs of Liberal Arts education.

Theory and/or Practice

Often the student with considerable mechanical aptitude is what might be termed "hand-minded" or "motor-minded," and would rather be "tinkering" with some material, process, or some mechanical device than absorbing more abstract information from a printed page. This preoccupation with things mechanical, and lack of interest in more abstract things relegates many mechanically minded students to mediocracy or actual failure in the usual high school or college course. Their problem, therefore, is not so much a lack of recognition of the need for certain studies while they are in school, as it is a lack of available foundations for associative learning of school subjects at the time they are exposed to them.

LeTourneau Tech's plan of part-time paid employment, associated with classroom work within the same day and each related to the other, is an attempt to provide a more adequate approach to the education of these essential and important members of society. The teaching of tool engineering students at LeTourneau within the classroom provides formal college level education (and two years of academy level or preparatory school where necessary) in the subjects which form the science and supplementary education so necessary to the Tool Engineer.

It is anticipated that the further development and growth of this school, within the near future, will allow it to provide a four-year college accredited course in science to its students; thereby giving them, not only the essential education for their chosen field, but also the advantage of an accredited four-year college graduation.

It seems just as reasonable to be able to provide a scientific education which is specifically in the field of interest of a professional mechanic in Industrial Science—within a four-year college period of time—as it is to give a four-year orderly education and a college degree to a school teacher, a student of Business Administration, or a student of the usual Liberal Arts Course.

The Machinist & Tool Engineering Curriculum

The present course consists of four college years of work (36 months). The subjects studied are as follows:

Mathematics on the college level, to and including calculus; mechanical drafting and general engineering drawing; elementary physics; elementary chemistry; tooling, jig and die manufacturing; metallurgy; tool and die design; a course in economics; materials and processes; industrial management; English; and the required history and government courses for graduation. All of these courses are specifically slanted toward the students' special interest; and, in addition to the foregoing courses, during the first two semesters, there is a course in machining and production theory which parallels the shop work.

The sequence of study of these courses is usually about as follows:

FIRST YEAR
- 113 Shop Theory
- 115 Shop Processes and Materials
- 113 Mathematical Analysis
- 113 General Engineering Drawing
- 125 Shop Process
- 113 English
- 113B College Algebra
- 113 Social Science
- 114 Physics

FIRST SUMMER
- 213 Shop Process
- 124 Physics
- 113 Social Science (or Industrial Management)
- 123 English

The designing, producing, and maintaining of simple cutting tools, and the grinding of more complicated cutters becomes a part of the student's education.

An orderly and searching study of the underlying science is a part of the classroom experience of the student. Physics and Chemistry, as applied to tooling and the associated mechanisms, are studied in well equipped laboratories under competent instructors.

SECOND YEAR
- 225 Shop Process
- 213 English
- 123C Trigonometry
- 214 Advanced Physics
- 313 Shop Processing (Tooling, Jig and Die Manufacturing)
- 223 English
- 213 Mathematics
- 223 Mechanics of Materials

SECOND SUMMER
- 323 Shop Process
- 313 Physical Metallurgy
- 123 General Engineering Drawing
- 353 Kinetics

THIRD YEAR
- 415 Shop Process
- 213 Machine Design
- 313 Hydraulics
- 413 Thermodynamics
- 312 Slide Rule
- 425 Shop Processes
- 213 Electricity
- 223 Machine Design (Tool & Die Design)
- 423 Metal Process
- 213 Government

THIRD SUMMER
- 424 Shop Process
- 413 Production Methods
- 413 Gears
- 223 Government

Laboratories

The use of laboratories, in teaching students of tool engineering, is of utmost importance at LeTourneau Tech because all machining and tool engineering students are those whose major interest is a scientific and engineering subject.

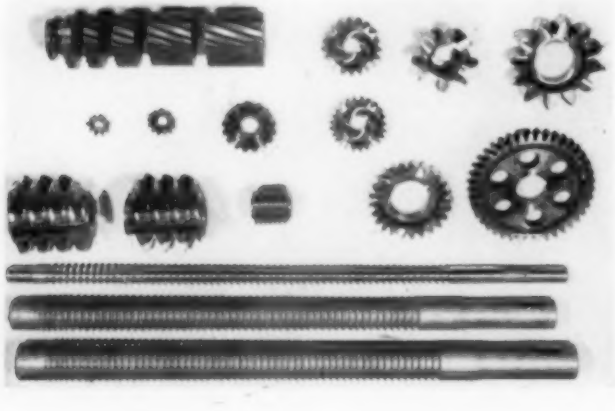
Three distinct types of laboratories are used, including natural science laboratories; a vestibule training laboratory; and the main course objective laboratory, which involves work done in the LeTourneau Company's factory. These labs are described as follows:

1. Well equipped physical laboratories are available for teaching the various courses in chemistry and physics. These constitute the natural science laboratories.

2. A special vestibule training laboratory, to train students in machining techniques, is equipped so that during the first three weeks of the student's stay in school, he may spend half of each day in this vestibule laboratory, learning the essential elements of operating machine tools. This is time spent without pay on the part of the student, and is preparatory to his being accepted as a part-time employee by the LeTourneau Company and entering the company's factory for his later studies. This time also serves as a period of exploration and try-out, so that the student may determine whether he, himself, believes that he is adapted to machining and tool engineering.

3. The actual experience of work in the shop provides an especially fertile field of laboratory experience, as previously discussed, because of LeTourneau's practice and policy in the use of tools and manufacturing equipment.

Familiarity with a wide variety of special broaching tools, milling cutters, and gear generating cutters becomes a part of the student's experience, on a scale impossible in the usual school program.



Industrial Library for Reference Work

An essential part of the equipment of the Institute is the Library, which includes a complete and broad selection of books on arc welding, machining, metallurgy, electrical and mechanical engineering, chemistry, physics, and the many allied subjects associated with modern mass production.

In this library, a very important portion is devoted to the trade journals, and periodicals; and the technical society journals, such as *The Tool Engineer* and the *Welding Engineer*, and *Metal Progress*, *The Iron Age*, and similar journals of interest to the metal working trade. Catalogs of machine tool builders, metal product manufacturers, and operator handbooks are also an important part of the collection of the library.

This library also serves as an important adjunct to the English and Economics classes, in that the literature available and the subject matter presented is used for classroom discussion and for improvement in the use of language, at the same time that additional technical knowledge is being added to the student's store of understanding of his subject.

The Future of the Graduate Student

The student—educated under the LeTourneau Technical Institute's plan which combines the manual elements, the engineering elements, and the supplementary elements such as mathematics, mechanical drawing, technical literature, and English—should be in a position to assume leadership in some place in his field within a short time after his departure from school.

The fact that he is a trained operator, with actual work experience extending over two to three years in a situation which provides very broad concepts of the use of modern machining and tooling, saves him a part of the time required by the usual mechanical engineering student who must serve a two to three year apprenticeship with the organization which he joins after schooling, before his broad-based learning becomes really profitable to him or to his employer.

Of course, a student from LeTourneau Tech is not a full fledged mechanical engineer, but he is a trained mechanic with manual experience, industrial experience, and the essential engineering, technical, and mechanical education to allow him to solve and answer the problems which lie beyond the realm of the usual machine operator.

Employment in the LeTourneau Company's various factories is *not* the primary objective of students at LeTourneau Tech. It is fully expected that a large number of the graduates will take their place in industry in their home town or other localities in the South, and that the LeTourneau Company will have to compete with all the rest of the area to obtain and hold Tech graduates.

It is not anticipated that these graduate students will immediately become plant managers, superintendents of large scale operations, Tool Engineers, and similarly influential personnel. It is, however, expected that they will accept full-time employment; and, by virtue of experience, vision, and college education, that they will forge ahead to industrial leadership. Certainly, they should progress much more quickly than the usual beginner in the machining field who starts as an operator and by virtue of skill, experience, energy, and part-time study gradually works himself to a position of leadership and responsibility in a manufacturing organization.

By James Walker

Drawing Die Problems and Formulae

A Comprehensive Treatise Covering Advanced Design and Construction Of Simple and Compound Drawing Dies for the Mass Production Industry

Installment No. 3 of a Series—The Selection of Presses

IN THE INTRODUCTION to this series, an effort was made to present facts conducive to a better understanding of the procedures employed in diemaking; and undoubtedly some parts have seemed elementary. However, lack of sufficient elementary information has been one of the deficiencies of many articles and books on diemaking, for this reason, the reader is urged to carefully consider the few following pages on presses, the context of which is entirely pertinent *to the general subject of this series.*

Press Selection—Its Purpose and Application

The reader may or may not be aware of the fact that, when purchasing a press, it is of vital importance that the proper consideration be given its selection. Many failures, together with low production in the fabrication of sheet metal, can be partially attributed to improper press selection. The fact that many of those concerned with tooling actually have little knowledge of the proper selection of a press—and this applies particularly to those employed by aircraft companies who have not had the opportunity to acquaint themselves with high production and the redrawing, deep drawing, coining and ironing operations—this lack of knowledge accounts for the almost exclusive use of the single action press.

A press, like a chain, is only as strong as its weakest link. The best frame built is a wasted engineering effort unless all mechanical components are of perfect design and in absolute balance. The following suggestions are therefore submitted in brief and should be an aid, not only in the proper selection, but also toward increased production.

Four General Kinds of Operations

The four general classifications commonly used to identify the hot and cold pressworking of metals are as follows: cutting, drawing, ironing, and squeezing operations. The cutting operations, which deal with blanking, trimming, and shaving, (either in single or compound operations) comprise a great percentage of the volume of stampings produced, and are performed in a wide variety of presses ranging from the common open-back inclinable (commonly known as OBI's) press, to the double-action, two- and four-point suspension straight-side presses.

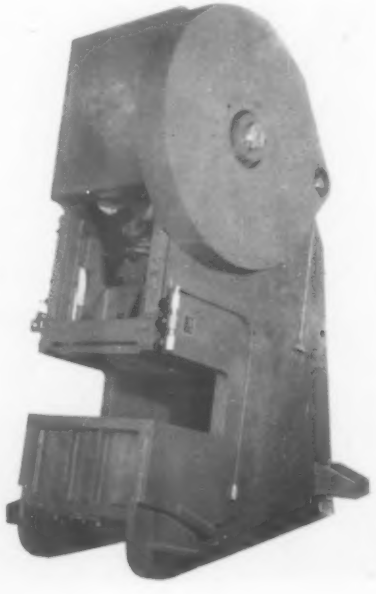


FIG. 23.

A press with one point of power application—such as the open-back inclinable, permanently inclined, open-throat vertical-gap type, or the narrow straight-side press—is generally used for producing relatively small parts. All of these presses are normally limited to a maximum distance of 36" between the housings, and are dependent upon the tonnage capacity required.

Open-Throat Verticals for Large or Small Work

The "C" frame press (as shown in Fig. 23) is commonly known as a gap or open-throat vertical and can be used for either large or small work. The gap press usually has an overhanging bed—i.e., a bed which is of greater width than the distance between the housings. Presses of this kind are ideally suited for large dies which require little pressure, also, for piercing or blanking in the center of a large sheet, or for progressive dies.

Two- and four-point suspension straight-side presses, as shown in Figs. 24 and 25, are generally used where the work is large, or where multiple and progressive operations are being run. Four-point suspension full eccentric presses apply pressure through four points over an unusually broad area. The four-point suspension presses have practically unlimited bed and slide area, and are available with quadruple drive and double gearing. They are designed for precision blanking, stamping, drawing, and forming of very large sections, such as turret tops, truck and body panels, sinks, caskets, gas tanks, airplane sections, and like parts. Because of the uniform exertion of force over the entire slide and bed area, multiple operations can be performed and uneven drawn sections produced with speed and precision.

Whether or not a drawing operation may be performed on a blanking press depends entirely upon the nature of work to be done. Sometimes, by equipping the press with an air cushion, this type can be used for drawing operations; ordinarily, however, a faster operating press is used for blanking operations. Shallow drawn work can be produced in a combination blank and draw die at blanking speed; however, deep draws require a slower press—i.e., a mid-stroke slide velocity will widen the drawing speed limits of the material being worked.

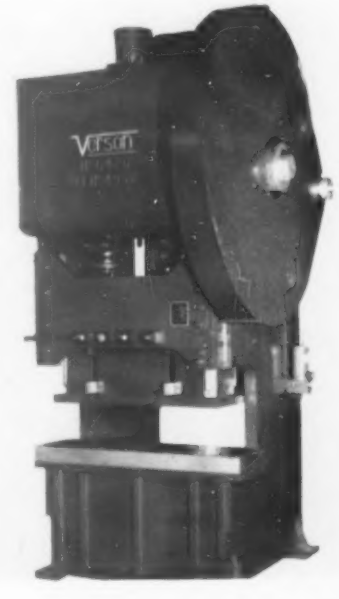


FIG. 24.

Hydraulic Presses for Deep Draws

On exceptionally deep draws, as well as on certain types of squeezing, forging and straightening work, hydraulic presses are especially desirable. The uniform speed travel of the slide at full load, and the fact that the tonnage is constant throughout the entire length of stroke, makes it possible to employ presses of less tonnage capacity than if a mechanical press were used.

FIG. 25.

"Ironing" Metal

The "ironing" of metal is an operation which can be done in any of the foregoing presses. This process is used to reduce wall thickness, and to produce shells having tapered walls not uniform in thickness near the top during the drawing process. However, a slower speed than is used in blanking is desirable because of the heat that is generated in ironing operations.

Coining, Embossing and Sizing

In the squeezing group are included such operations as coining, embossing, sizing, and hot and cold forging, such operations generally requiring a type of press different from those previously discussed. Coining, embossing and sizing are usually of such nature that intensely high pressure is required for relatively short time interval or stroke distance. It is for this reason that knuckle-joint coining presses are ideal. Fig. 26 shows an interesting application of a combined magazine and dial feed setup on a coining press.

Hot forging work demands a fast acting, high speed, extremely stiff and rigid press, and although the knuckle-joint press has all the stiffness and rigidity required, a knuckle-joint or coining type of press with knuckle action is undesirable for the common run of hot forging work. The dwell of the slide (usually equal to 15 degrees of crankshaft travel) is not conducive to good die life. There are, of course, certain types of forging operations which can be done in presses other than high speed forging presses, but great care should be exercised when selecting a press for this type of work.

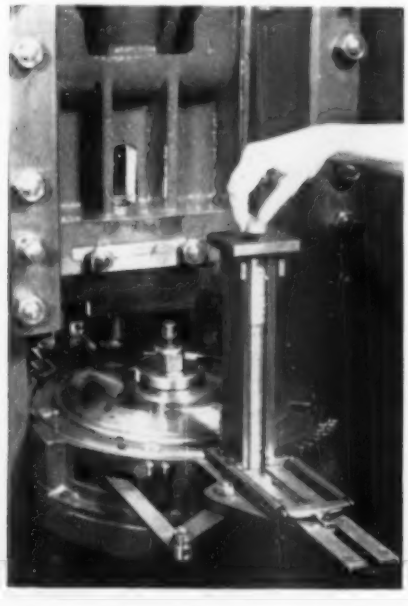


FIG. 26.

General Suggestions

There are several important points to be kept in mind for those who intend to open up new factories, or those who intend to improve factories already established. First, there is a definite place in the metalworking industry for the modern, high-speed-permanent-inclinable press, shown in Fig. 27, and presses of this type are becoming increasingly popular. The incline of such presses is usually 20 to 25 degrees, which is sufficient to enable the blank to slide from the die into a receptable, or to drop through the bolster plate of the press, as the case may be. An excessive incline complicates diesetting.

Second, permanent-inclined presses are rapid in operation and are especially adaptable to the blanking operations. They, too, can be used for shallow draws in compound dies, for such operations as blank and cup. The permanent-inclined press should be placed as near the shears as possible to facilitate handling the materials—as a matter of fact, all blanking presses should be placed as near the shears as possible.

Double-Action Presses

A press that is not too well known in a great percentage of factories is the double-action press, shown in Fig. 28. This is a very efficient press and is usually employed to blank and cup, redraw and pierce, hold and draw, cup and redraw, or for deep drawing operations. By the use of the double-action press, a more even flow of the metal can be obtained; consequently, a deeper drawn part can be produced. The only difference between a *single-action* and a *double-action* press is that, in the double-action press, there are two upper slides. The outer slide (commonly termed the blank holder) can be adjusted to blank the part and then hold the part, while the inner slide (commonly known as the plunger) descends, and completes the drawing operation.

Use of Modern Air Cushions

When a single-action press is employed for a drawing operation, the blank is supported by a pressure ring which, in turn, is supported by a cushion of air. With the descent of the press, the ram increases its velocity and is nearly at its highest speed at the time it reaches the blank. The result is a brutal impact of these two opposing forces which is severe, not only to the material but to the tools themselves. The desired "flow" is entirely cancelled out.

Also true is the fact that in most cases where air cushions are employed the pressure of the air cushion increases with the descent of the press; hence, on the upward stroke of the press, the pressure pad is exerting its full degree of power to eject the formed part while the part is yet contained in the die-cavity. It is not until the pressure pad travels its complete distance upward that the pressure ceases its pushing force, sometimes buckling the formed parts, especially when thin material is used.

The crude, antiquated pressure plates, which were

FIG. 27.

constructed from railroad car springs and rubber discs of various thicknesses, have now given way to the modern air cushions. However, there is an important detail that claims attention—that is, the new pneumatic die cushions which are provided with a locking device. These cushions, which are not to be confused with the average air cushion, are designed with a liberal ratio between the cylinder area and the surge-tank area; thus, pressure "build-up" is negligible throughout the cycle.

Provisions are made for varying stock thicknesses, and the pressure can be controlled by simply turning a control valve; therefore, rejects are held to a minimum and a more even flow of metal can be achieved. The hydraulic locking device is an attachment which serves as a "delayed action knock-out." For draw work in single-action presses, this locking device can be so controlled that, when the bottom of the stroke is reached, the cushion is locked in place until the ram completes the cycle, thus eliminating deformation of the light gage drawn sections. See Fig. 29 and 29-A.

Place of the Self-Contained Hydraulic Press

There is a definite place in the metalworking industry for the modern, high speed, self-contained hydraulic press. Therefore, when considering the purchase of a variety of presses, or when considering ordering additional equipment, the item of a hydraulic triple-action press should not be overlooked. As compared to mechanical presses, setup time is considerably less. For with mechanical presses, after the dies are secured, both the inner and outer slides must be adjusted, and this is often a lengthy procedure.

The discs in the hydraulic press are merely placed between the two platens and, once they are lowered and the tools secured, no other adjustment is necessary. The choice of a hydraulic press, then, applies particularly to the aircraft industry, or to any industry where low production runs are common and where setup time exceeds actual "runtime." Under such conditions, their use results in a considerable saving over a period of time.

Several other factors relative to hydraulic presses should be mentioned at this time: First, there is the element of rapid traverse, both in the descent to the blank and the return after the drawing operation; second, slow speed during the drawing operation, which is a necessity at times; third, a more even flow of the metal, due to the constant movement of the platens; and fourth, the pressures applied to the blank, as well as the speed of the drawing operation can be adjusted very easily by a control valve.

One other important consideration is that, in the event a plant can afford only a press or two it would be better to select the more versatile OBI press as shown in Fig. 30 — that is, unless the majority of operations are of the drawing variety. Then, too, problems arise when many trimming operations are required. In such cases, both space and costly equipment can be eliminated by the adoption of a press with the additional trimming attachment as shown in Fig. 31.

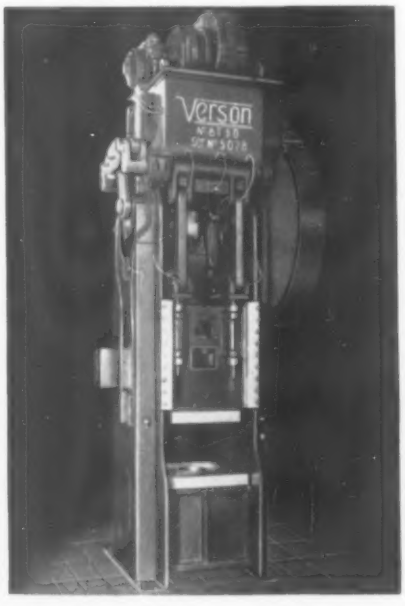


FIG. 28.

Types of Power Application

Flywheel type presses, frequently referred to as open-belt presses, are those in which the energy of the flywheel is transmitted directly to the mainshaft. Flywheel type presses are recommended only for light blanking operations of metal less than 10-gauge thickness and for high speed press operation.

Single geared machines, where the energy is transmitted into the mainshaft through one gear reduction, are recommended for heavier blanking operations. They may also be employed for shallow draw work or push-thru operations. They normally operate at speeds of approximately 30 to 40 strokes per minute.

Double geared machines, where the energy is transmitted into the mainshaft through two gear reductions, are intended for drawing operations when it is important that the mid-stroke speed of the slide be within the safe limits which the material being drawn will stand. Dependent upon the tonnage capacity of the press, and the length of its stroke, speeds normally range from 14 to 20 strokes per minute.

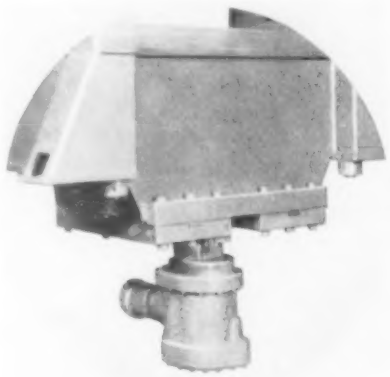


FIG. 29.

Whether the press is single- or double-geared, energy can be transmitted to the slide from one gear or from two gears on the shaft. Single crank presses of low tonnage capacity with short strokes are not usually twin driven. Because of the narrow span of the mainshaft from bearing to bearing, single crank presses are not subjected to as great a torsional twist as are the presses of greater span. It is always advisable to have twin drive for a long stroke crankshaft whether of long or short span between the housings.

Promotes Operator Convenience

The main shaft of a press is subjected to a negligible amount of torsional twist. Single point suspension presses up to and including 150 tons, having an average stroke length, are usually single driven. Presses that have a greater tonnage than 150 tons are twin driven regardless of stroke length. All heavy tonnage or wide span presses should be equipped with motorized adjustment of the ram, which provides quick and effective die-setting, adds to operator convenience and is therefore especially adaptable for shops where frequent die changes take place.

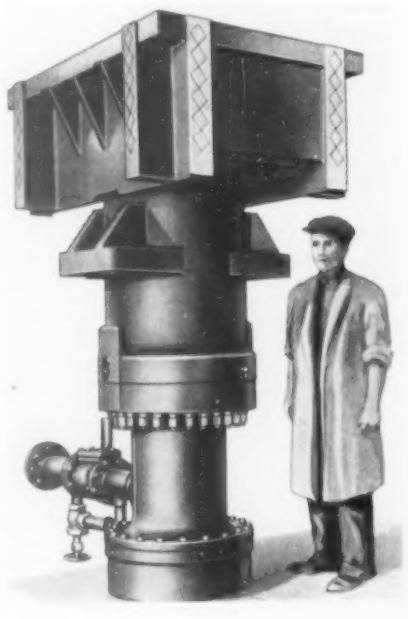


FIG. 29A.

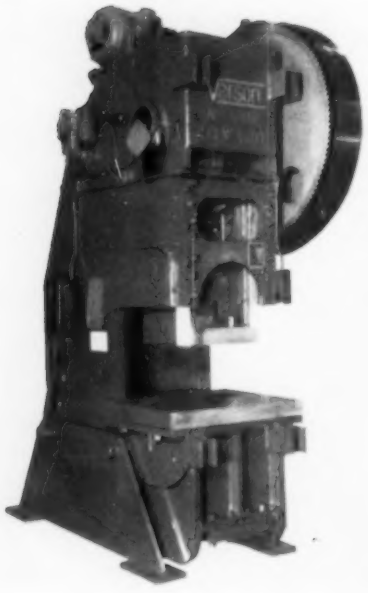


FIG. 30.

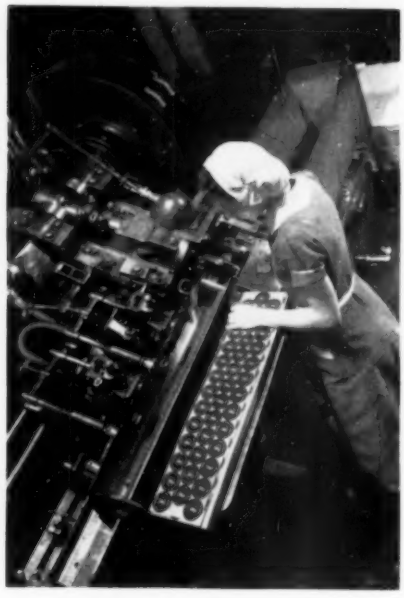
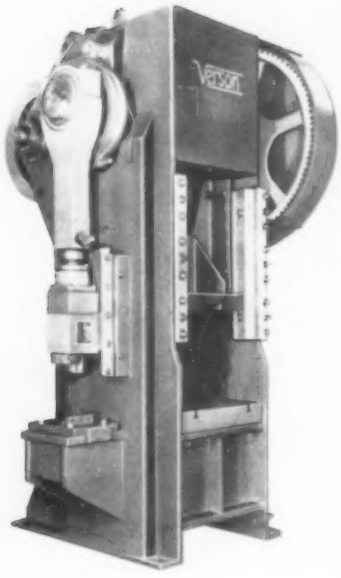


FIG. 31.

FIGS. 23 to 32, this installment, by courtesy of Verson Allsteel Press Company, Chicago, Ill. Below, high production stamping on automatic press. Photo by courtesy of Aluminum Company of America.



Counterbalancing Essential

Air counterbalance of the slide also adds much to the safety and longevity of the press. Counterbalancing cylinders, usually two in number, may be had as standard equipment and of sufficient size to offset the weight of the ram and average die weight. This greatly relieves the load on the drive unit of the press, keeps bearings snug, and makes for much smoother operation. No modern press should be purchased without this feature.

Air operated flywheel brakes are also desirable since they will stop the flywheel within a few seconds. Quick flywheel braking increases the life of flywheel bearings and belts, and also reduces the time required to change from one die to another. *The "Golden Rule" of press shops is not to load the press beyond its rated capacity.* The press, like any other piece of equipment, cannot give excellent service if it is abused with excessive overloading. If properly operated, on the other hand, they will last indefinitely, will require little maintenance and will operate with the accuracy and precision which is built into them.

Installation

We will not go into detail regarding installation; however, we will mention this cardinal rule: A press should be mounted on a strong and well-footed foundation. Fasten the machine to the foundation through anchor holes provided in the press base, and be sure the press is setting level before grouting in place.

Procedure for Setting Dies

Great care should be exercised when changing over from one job to another, since improper setting of dies has caused much damage to presses and dies. An effective procedure to follow when setting dies is as follows:

1. Determine the press shut height needed for the dies.
2. Set the press stroke on dead center in the down position.
3. If the shut height—bolster to slide, stroke down—is not sufficient to receive the dies, move the slide up the required amount, plus clearance, by means of the adjusting mechanism. Then set the dies in place.
4. Move the slide down until the slide, punch, and die meet. Then securely attach the punch to the slide and the die to the bed.
5. After fastening, traverse the slide upward by operating the adjusting mechanism until there is a safe clearance between the punch and die.
6. With the clutch disengaged, in the case of friction clutch equipped presses, start the driving motor to bring the flywheel up to speed. Then shut off the power, engage the clutch, and return the slide to top stroke position.
7. With the power still shut off, "inch" the slide down by using the "inching" button of the press control and recheck your setting. Then make your final setting using paper or cardboard of approximate stock thickness before getting into actual production.
8. Take a little longer—be sure of your setting—it will pay good dividends.

"Unsticking" the Press

Occasionally a press will lock on center during an operation. When this occurs *never attempt to "unstick" the press by using the power slide adjusting motor*, should your machine be so equipped. The slide adjusting unit is not intended for this purpose and to use it thus may result in costly damage. Sticking occurs most frequently when heavy forming, coining, sizing, drawing, embossing and forging operations are being done, but seldom occurs during blanking operations.

The very first step toward "unsticking" a press is to determine whether the stroke cycle is ahead of center or is behind center. This will establish the course to follow, viz., if your press is equipped with a pneumatic clutch and brake, increase the air pressure of 70 to 80 lbs. to about 100 lbs., and check your clutch adjustment to be certain that it is not too loose.

If your press is equipped with a mechanically actuated friction clutch and a band type brake, release the brake completely. Check the clutch for proper adjustment for maximum pulling capacity when engaged.

Should the first check made indicate that the sticking occurred "behind center," reverse the direction of rotation of the motor; engage the clutch and back the slide off of the work.

If stuck ahead of center, engage the clutch and carry the press through on a forward cycle. In almost every case encountered, this method will work successfully. It may sometimes be necessary to make several attempts, especially if the press is severely stuck.

End of Part 3, this series. Installment No. 4 will follow in July, The Tool Engineer.

By Phil Glanzer

Aluminum Glamorized by Color

Dreams of Alchemists Are "Realized" As A Result of New Finishing Techniques

Mr. Glanzer

GLAMOR HAS COME to aluminum. The most abundant metal in the earth's crust is moving from the kitchen sink into the living-rooms of the style-conscious; and, in the shape of singularly attractive and rich-looking giftware, it will soon be seen as often in modern showcases as it now appears in humbler form on the shelves of the hardware store.

Firmly entrenched in the public mind as a lightweight, durable metal that was glamorized during the war through its use in the manufacture of planes, aluminum is now taking mincing, but sure strides into the realm of beauty. It's taking on color—done through "anodizing."

The war years, with their austerity standards and their emphasis on new and better things to come, have built up a great public hunger for color, luxury and richness, novelty and variety. They have also made the public very conscious of the lightweight metals. Electro-chemistry has made it possible for aluminum to answer all these desires.

What Anodizing Is

While anodizing is not new, the introduction of color is just swinging into its stride. It preserves the virtues of aluminum but allows it to assume many of the characteristics of other metals, and even many non-metallic substances. It has made possible a very wide range of colored, anodized aluminum giftware items which are now becoming available.

During wartime, however, most of our giant warplanes—and now our peacetime commercial planes—were anodized. So are sky-reaching church steeples, and so are strips of metal seen on restaurant counters and sinks, and on countless walls in the form of moulding. In many other instances, anodized aluminum ware has been on the market for some time.

But the process of anodizing is receiving new industrial importance, based on the fact that aluminum builds up an oxide surface through a "film," even under ordinary atmospheric conditions. "Anodizing" aluminum, then, means building up and strengthening and integrating this film with aluminum; therefore, anodizing and subsequent "sealing" makes use of this characteristic of aluminum to build up the surface of the aluminum into a sapphire-hard, colored or clear film in such a way that the film and the aluminum are for all practical purposes inseparable.

Under the "Alumilite" process of anodizing, the natural oxide film is increased and fortified by an electrically charged sulphuric acid solution, immersion in which causes the aluminum to become an anode. In other words, this means that a hard, porous coating is built up on the metal surface from within the metal itself. The porosity of this anodic film allows any color in any degree of density from a delicate tint to a rich, robust hue to be impregnated to depth, right into the metal itself.

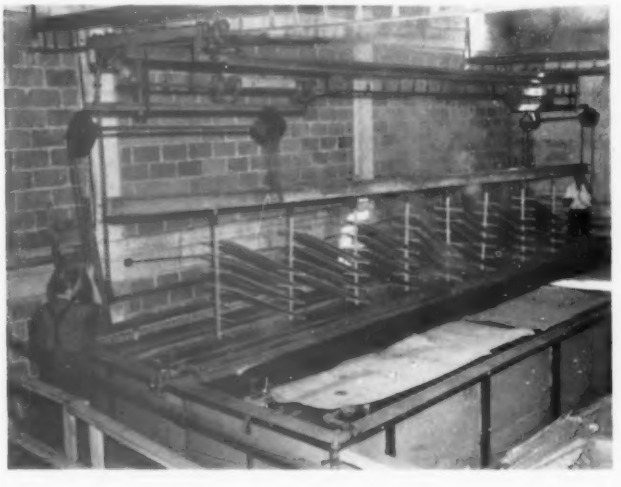
A "Chameleon" Process

Permanency is given to the surface by a special "sealing" process, and an ingenious use of buffing produces a variety of desirable or novel surfaces and finishes, including the appearance of almost any other metal.

The final result of this anodizing process is a surface which, though thin, is as hard as sapphire. This means that it will not chip or crack or readily scratch. It can be cleaned easily, will not take a stain, nor stain the things it touches. It also tends to strengthen the aluminum; but, if the aluminum should become dented, the dent can be readily removed without marring the surface.

Grant Clouse, General Manager of Canadian Anodized Products Ltd. at Aurora, Ont., explains technical processes in the plant, largest of its kind in Canada, to a production chief. Mr. Loken, shown pointing to a gauge, perfected the anodizing process during its infancy.

There'll be dabs of color on ski runs next winter—thanks to anodized aluminum. Tens of thousands of aluminum ski poles are being anodized with color, notably blue, by Canadian Anodized Products Ltd., for sporting goods' manufacturers. Giant racks, holding hundreds of ski poles, are shown being raised from a tank of sulphuric acid, in the first step toward integrating color into the poles.



In the unlikely eventuality of a scratch, the scratch can be rectified by the simple application of steel wool. Finally, the surface, and the metal beneath it, are highly resistant to abrasion and corrosion.

The surface thus produced can assume any color in the rainbow, in any shade, and can be made to look uncommonly rich. These colors include "clear," which offers the attractive appearance of natural aluminum itself with the advantages of the anodized surface. The texture of the surface might range anywhere from the dull, heavy look of old pewter to the mirror-like gleam of polished nickel. In fact, by this process, aluminum can be made to look like gold, silver, nickel, copper, brass, bronze or pewter.

Because of the hard surface, anodized aluminum ware can be washed or scrubbed without apparent signs of wear or dullness.

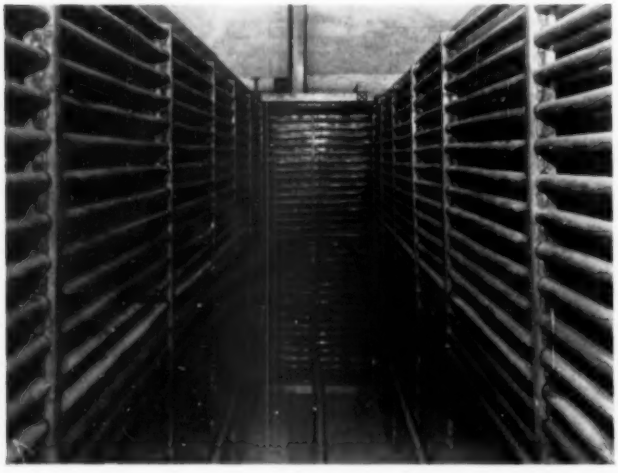
Precious Metals Simulated

Out of great bubbling vats and tanks are coming simulated gold serving dishes, brightly-colored pen and pencil sets, aristocratic looking but lightweight serving trays with the appearance of silver, simulated silver cocktail trays, simulated silver tumblers, many-colored toys and candy dishes, thermos jugs, coffee and tea pots.

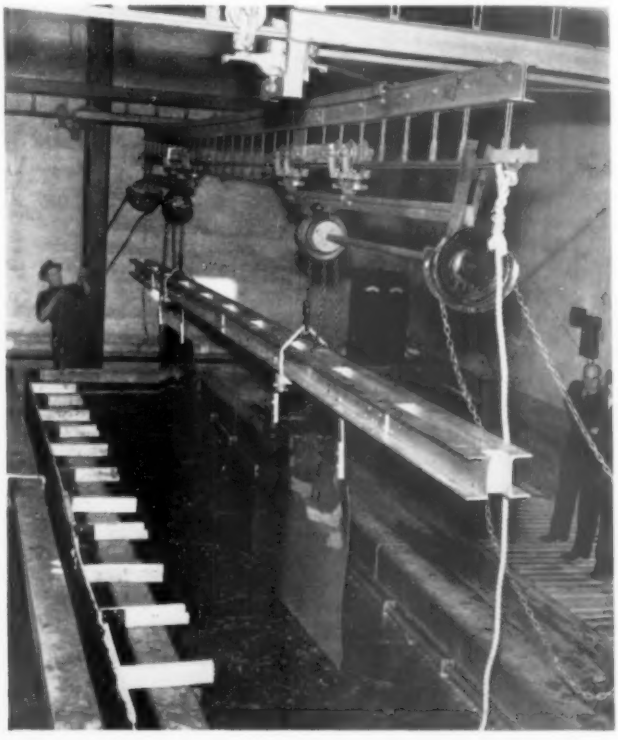
Strikingly colored aluminum venetian blinds are being seen in offices and homes, along with radiator covers, chairs and tables. Some color is being seen in golf bags, and in closets containing skiing equipment.

Aircraft manufacturers are anticipating spotting the skies with flying dabs of color. Picture framers like the simulated gold and silver frames made possible through anodizing aluminum with color. Giftware, and costume jewelry merchants are anticipating sprightly holiday wares, with attractive lines made possible through this new industrial development. The future looks bright for brightly-colored aluminum.

An "inside" view of a sulphuric acid tank, partly emptied. Aluminum sheets or finished products are immersed in the electrically-charged acid bath until the metal's natural oxide film is built up and strengthened from within the metal itself. This treatment brings out a sapphire-hard, porous coating that permits integration of any desired color.



Attached to clamps suspended from overhead trolley, sheets of aluminum, previously anodized, are being immersed for coloring in a tank of electrically-charged blue dye. The color will become integrated with the aluminum, becoming a part of the metal, not merely a coating.



2,000,000 Color Shades Matched

CURRENTLY USED at the Pemco Corp'n, Baltimore, to simplify the matching of porcelain enamel and glass colors to provide a constant quality control check, a recording photoelectric spectrophotometer, by General Electric Co., accurately measures over 2,000,000 color shades. The instrument is expected to cut matching time severalfold as compared to previous methods.

Manufacturers of porcelain enamel and glass colors, and "frit"—the raw material making up porcelain enamel before it is fused to metal—Pemco must frequently produce colors to match samples sent in by customers. Previously, this was done by visual comparison, difficult and often inaccurate since, under certain lighting conditions, two colors may appear matched to one person and mismatched to another.

Now, Pemco has established a "library" of over 1000 color curves of known composition, representing every porcelain enamel and glass color produced since the instrument was installed. The spectrophotometer analyzes a sample color with a "norm" curve, whereupon a color mixer computes the color ingredients until both curves match exactly. Operation of the instrument is extremely simple. One needs merely to insert a color sample and a standard, in inspection holder, place a recording paper on the drum, and select the correct recording speed.

By National Bureau of Standards

Indentation Methods for Measuring Wear*

A New Tool Provides Measurement of Wear to Extremely Small Increments—as Low as 0.00001"

ONE OF THE MAJOR difficulties in determining wear of machinery surfaces has been the lack of a convenient method for accurately measuring the amount of material worn off. Among methods that have been widely used are weighing and measuring the dimensions of parts before and after wear, and determination of the amount of worn material found in the lubricant after operation. Even under ideal conditions these methods have serious limitations which, coupled with the fact that they often measure other conditions along with wear, indicated the desirability of a method of measuring wear that is independent of the size or mass of the wearing piece.

Investigations conducted at the National Bureau of Standards, under S. A. McKee, led to the adaptation of a diamond indentation method of measuring wear. As a result, a sensitive measuring instrument—the McKee Wear Gage—was developed. This gage measures extremely small increments of wear—as little as one hundred-thousandth of an inch under favorable conditions, or considerably less than with other methods. By applying to the working surfaces narrow diamond-shaped markings that show a definite change in one or more readily measurable dimensions after relatively small amounts of wear, the gage provides a determinable indication of wear at the point where the marking is made.

Overcomes Previous Shortcomings

Extensive tests at the Bureau have provided conclusive evidence that the indentation method of determining wear overcomes the shortcomings of other methods. For example, the weighing method gives a value for the total wear but does not indicate where the wear occurred. Measuring the changes in the dimensions of a worn piece has this same limitation to a lesser degree and does not differentiate between actual wear and other changes that may occur such as growth, shrinkage, or distortion of the part. The method of determining the amount of worn material in the lubricant presents a number of difficulties and usually is used only as a qualitative indication in conjunction with other data.

The McKee gage was designed primarily to locate and measure indentation marks on the cylinder walls and pistons of radial aircraft engines, since permanent distortion of such parts during operation had heretofore nullified the significance of any previous methods of measurement. The choice of the type of mark was influenced by an earlier development at the National Bureau of Standards—the Knoop Indenter for measuring the hardness of materials.

Special Apparatus Developed

Special apparatus was developed for making and measuring the marks placed on the wearing surfaces by the diamond indenter of the wear gage. With a cylinder or piston mounted in a specially designed fixture, marks are applied at any desired position on the surface by means of the diamond point, which is forced by mechanical pressure to a predetermined depth into the surface piece. The viewing and measuring apparatus consists of a conventional microscope and eye-piece scale, modified by the addition of two right angle prisms so that it may be used as a periscope for viewing the inside of the cylinders.

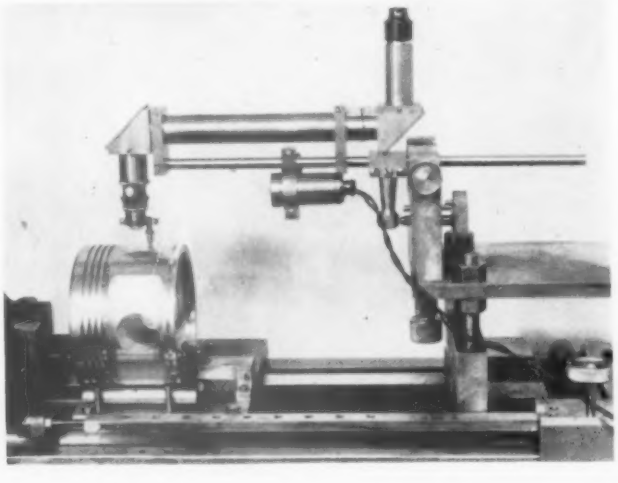
The impression of the marks in the surface of the metal raises a burr around the mark. The shape of the diamond indenter is such, however, that the major portion of the burr is formed on the sides of the mark. Though no burr is visible to the eye at the ends of the marks, the presence of a very slight elevation of the surface may account for the minor deviations from a straight line shown by calibration curves. In the course of the investigation it was found that most of the burr could be easily removed by rubbing lightly with fine polishing paper.

For use with the cylinders, a sheet-metal guard similar to the usual erasing shield, but of larger dimensions, was

*Developed at the National Bureau of Standards by S. A. McKee at the suggestion of and with collaboration of Dr. H. C. Dickinson. The method is covered by U. S. Patent No. 2,233,403, granted to Dickinson and McKee and assigned by them to the United States Government.

FIG. 1. The McKee Wear Gage set up to make marks on inner surface of aircraft engine cylinder. A diamond indentation, applied to any desired position on the surface, is of such shape that a relatively small amount of wear effects definite change in one or more measurable dimensions of the mark. The method indicates wear to ± 0.00004".

FIG. 2. The viewing and measuring apparatus used in conjunction with the McKee Wear Gage consists of a microscope and eye piece scale modified to be used as a periscope for viewing the inside of a cylinder. In this setup the apparatus is being used to view and measure the changes in dimension of a mark placed on a piston surface in order to determine the amount of wear.



found convenient. The holes in this guard are so arranged that the polishing paper can be rubbed over a small area at each mark on the cylinder wall with one finger. As the marks are placed with their long axes perpendicular to the axis of the cylinder, the relation between the change in depth of mark to change in length of long axis is affected by the curvature of the cylinder. While this effect is relatively small for the particular cylinders used, suitable corrections for curvature provide greater accuracy in determining wear.

A study was also made of the possibility of error due to the axis of the diamond indenter not being at right angles to the surface when the indentation is made. Computations indicated that if the diamond-shaped mark was symmetrical to within a ratio of not less than 41 to 50 along its major axis, the error would be no greater than one per cent (approximately 0.00001 in.). It was found that the apparatus could be adjusted to produce a symmetrical mark and that other marks, either in the same cylinder or in other cylinders of the same nominal size, could be made well within the limits of symmetry without further adjustment. Accordingly, corrections for lack of symmetry were not necessary.

One of the important considerations in the Bureau's investigation was uncertainty as to whether the marks would return to their shape during operation of the engine. Results of a number of engine tests have shown that marks in the cylinders of radial aircraft engines retain their shape sufficiently to provide reasonably accurate wear measurements.

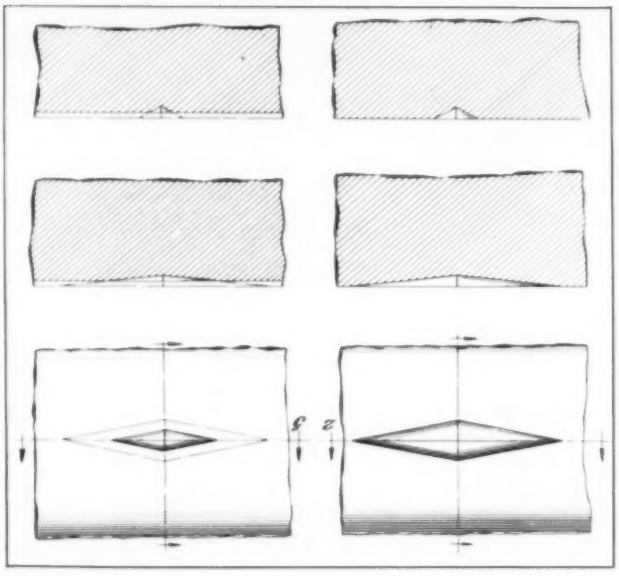


FIG. 3. Enlarged diagrams of a typical indentation made by pressing into the wearing surface the apex of a four-sided diamond pyramid having a rhombus-shaped base. Views at left (top to bottom) are the plan, longitudinal and transverse sections before wear has occurred; those at right are the same marks after material has been worn from the surface. Shape of mark remains the same, but length decreases in ratio to thickness of metal removed. For the diamond used, the ratio of depth of mark to length of long axis is about 1 to 35—i.e., a mark .001″ deep will have a long axis approximately .035″.

Experience has indicated that results are not as satisfactory after the marks have been worn to about one-fourth their original length or less. Hence, greater accuracy may be obtained by carefully regulating the size of the mark and adjusting the duration of the test to prevent this condition.

The precision of the wear measurements depends upon the condition of the indentation. With new marks, the points are sharp and the lengths can be accurately determined; however, after the engine has been operated the marks are somewhat blunted and it is necessary to estimate the position of the point (Figs. 3 and 4). Under normal conditions, the cylinder wear can be determined with an over-all accuracy of ± 0.00004 inch. For more favorable conditions the degree of accuracy can be increased to ± 0.00002 inch. Operating experience with marks in the pistons indicates that, with the softer aluminum alloy, the marks have a much greater tendency to distort and the results are not entirely satisfactory. Another difficulty with this material is its tendency to become impregnated with carbon, thereby making it difficult to distinguish the marks.

Most of the engine tests for determining the performance of the marks in service were made with Pratt and Whitney R-1535 engines having chrome-molybdenum steel cylinder barrels 5-3/16 inches in diameter. In these tests, 24 marks were made in each cylinder, 6 spaced 60° apart at each of 4 levels—approximately 2, 4, 6 and 8 inches from the open skirt end of the cylinder. The upper row of marks was in contact with the top ring only while the lower was contacted by the oil ring. Typical cylinder wear patterns obtained in these tests reveal unsymmetrical wear with

FIG. 4. Photograph (after wear) of two typical marks used to determine extremely small increments of cylinder wear. The marks were originally about 0.9 mm long. The scales shown represent an actual length of 1 mm (.0394″) but when observed in the viewing apparatus are 2½″ long. For the diamond used, and chrome-molybdenum cylinders, the total length of the scale represents about .0012″ in depth, hence one of the small scale divisions is equivalent to slightly more than .0001″ of wear —a good indication of the sensitivity of the method.

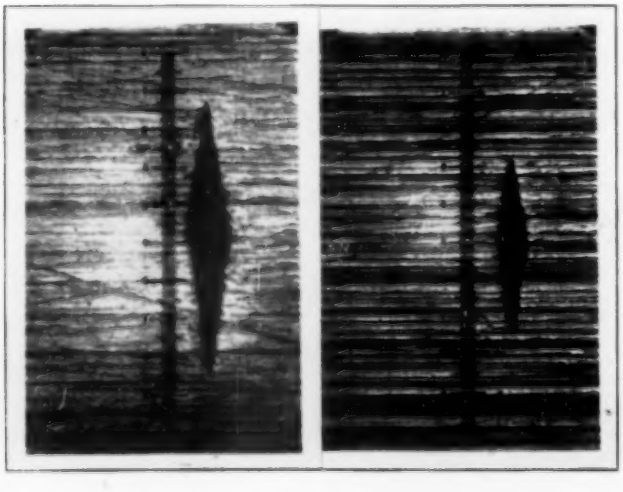
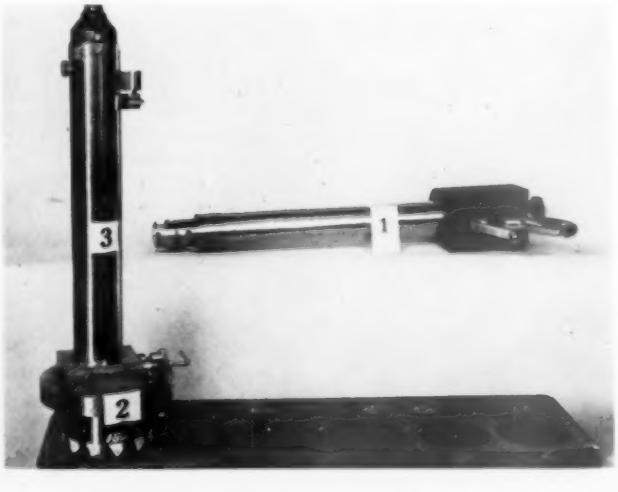


FIG. 5. The McKee Wear Gage, developed at the U. S. Bureau of Standards, as designed for use with automobile engines in which the cylinders are cast into a single engine block. The three components of the instrument are: (1) Indenting tool; (2) Indentation locator and (3) Microscope.



respect to the axis of the cylinder that would be impossible to determine with usual measurements of diameter.

Employing the basic principles of the original McKee gage, an instrument was designed by the American Instrument Company for use with automobile engines in which the cylinders are cast into a single engine block. This instrument, used in an extensive series of tests by C. S. Bruce, J. T. Duck, and A. R. Pierce of the Bureau's Automotive Section, permitted accurate studies of the effects of wear in stock passenger-car engines operated under controlled conditions. The test engines were operated for 144 hours (approximately 3000 miles of normal operation) between wear measurements, the operating cycle consisting of 20 minutes of actual operation with a 10-minute stop for cooling. During the stop period a special cooling system reduced the temperature so that the engine was started from a cold condition at the beginning of each half-hour period.

Field for Further Investigation

Results of these tests, in which the average cylinder wear was about 0.00002 inch per 1000 miles of operation, verify a previously accepted theory that operating conditions have a decided effect on cylinder wear, there being in general a greater amount of wear when starting the engine at low temperature than at high temperature (50°C). The data provided by such sensitive determinations of wear also indicated the possibility that corrosion is responsible for a major part of the wear occurring in normal operation of an engine. It is believed that moisture, condensing on cold cylinder walls, serves as a base for the formation of corrosive acids from the gases in the products of combustion. It appears that engine life may be substantially increased by any feature of design that accelerates the engine warmup or prevents the temperature of the cylinder walls from falling below the dewpoint of the exhaust gases. Additional data on the corrosive qualities of fuels would be desirable.

The indentations used in the studies at the Bureau were made by impressing into the test surface the apex of a four-sided diamond pyramid. From the standpoint of accuracy the chief limitation is that the sharp points of the marks are blunted somewhat when wear occurs. Possible use of cutting or grinding methods for producing marks without burrs and without sharp-pointed ends presents a promising field for further investigation. If this can be accomplished, the accuracy of determining wear would be greatly increased.

The McKee wear gage provides the particular advantage of an indication of wear only, while the usual measurements of changes in diameters of the pistons and cylinders do not differentiate between wear and distortion that may occur during a test. It also indicates wear at a particular point on the surface, whereas measurements of diameter involve changes at two points and practical means are not generally available for determining the amount of wear at each point. Also, the method does not require the careful technique necessary to measure diameters with corresponding accuracy.

As temperature variations do not materially affect the accuracy with the indentation method, it is not necessary to bring the cylinder to a definite temperature before making the measurements. The apparatus is provided with locating pins and is so arranged that a mark made at given pin settings will fall within the field of vision of the periscope at the same settings. This eliminates loss of time in searching for the marks which are too small to be readily discernible to the eye.

In addition to its use as a practical method of measurement of wear in aircraft and automotive engine cylinders, the indentation principle appears applicable to other machine elements, gages, dies, and wearing surfaces where the material is of such a nature that the indented marks will retain their shape in service. For example, a mark placed on the wearing surface of certain production dies would readily indicate when it had been worn beyond specified tolerances.

Engine Testing at Buick

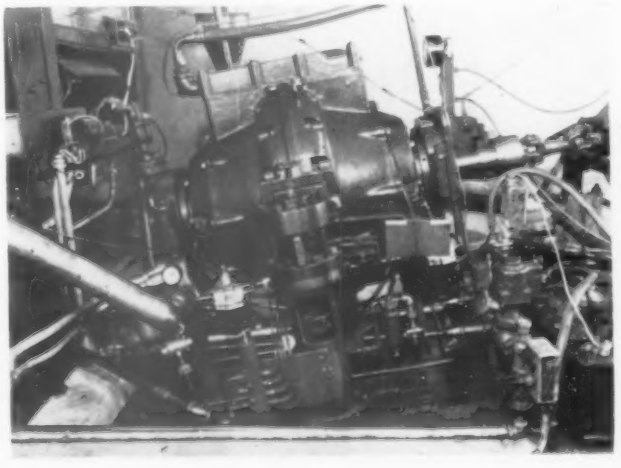
IN BUILDING A NEW SETUP for engine testing, engineers at Buick Division of General Motors are measuring force and horsepower with new methods, using the Pittsburgh-developed Hagan Thrustorq as the measuring instrument. Results over the past two years have proved so satisfactory that similar devices are to be employed on many different testing jobs.

In developing the new testing procedure, it was felt desirable to test Buick engines at approximately the same angle at which they will operate in the finished Buick automobile. As a result, the present dynamometer installation is tilted 10° from the horizontal. This permits operation of the engine at angles up to 20° without a serious angular deflection in the universal joint which transmits engine power to the dynamometer. If desired, however, the dynamometer could be mounted at any angle from horizontal to vertical.

Buick is using the Thrustorq for both endurance and power runs. Standard practice involves running the engine for 100 hours and then taking it off the stand. It is then completely disassembled and checked for wear. After the checkup it is again placed back on the stand and run to failure at continuous speeds well above those expected to be developed even in abnormally high speed operation of the finished automobile.

Two other major tests are now being planned, each—according to Buick engineers—to be equipped with Hagan Thrustorqs. One will be in connection with a Gleason axle-testing machine. In this test two axles will be hooked together, with force being applied in opposite directions. The force applied by the Gleason machine will be measured by the Thrustorq, and tests will be carried to failure of the axle. A 60 sq. in. Thrustorq capable of measuring torque from 200 to 185,000 pound-inches will be used.

Inclined engine dynamometer equipped with Hagan Double Thrustorq (center foreground) for testing automotive engines which are mounted in chassis on an inclined plane.



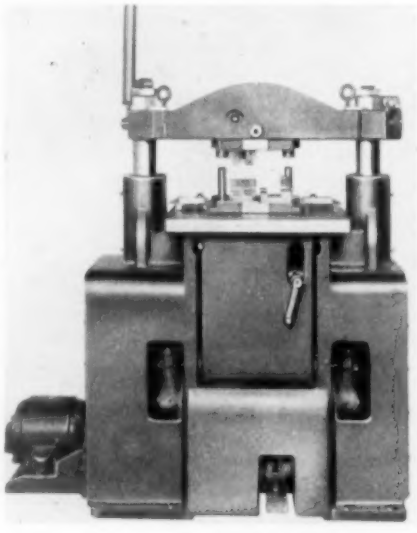
By Gunnar Skog

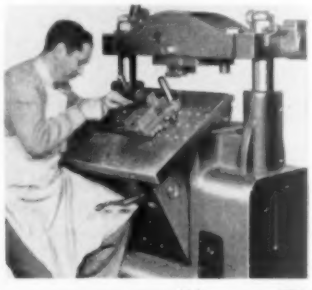
Versatile New Press Speeds Die Tryout

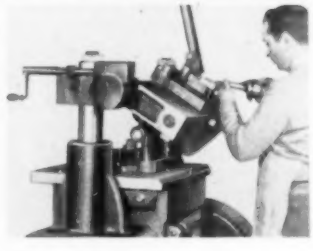
Novel Design Incorporates Positioning To Provide "On the Spot" Corrections

A NEW PRESS—the Alpha Model 40—is so engineered that dies may be tried out under actual production conditions, the while making corrections and finishing easier, faster and considerably more accurate. Designed to be used for production stamping, if so desired, the press incorporates positioning features so that bolster and head can be tilted forward so that the die being tried can be made more accessible for correction and finishing.

An outstanding feature of the tool is that necessary corrections and finishing work may be done on both male and female members without removing them from the press. Position pins, which retract with a crank, permit tilting to most advantageous angles for fitting and visibility; then, when corrections have been completed, the die returns to original position for accurate check of results. The advantage of this feature is obvious.







As the name implies, the Model 40 has a capacity of 40 tons. Stroke (100 per minute) is 3¾", shut height, 8 to 6 inches, maximum and minimum, and clearance between columns 27". Indicative of thought to safety features is the recessed trip lever, concealed in the base of the press yet readily accessible to the operator. Ample knee room is also provided, for the convenience of the tryout man, when the bolster is tilted forward.

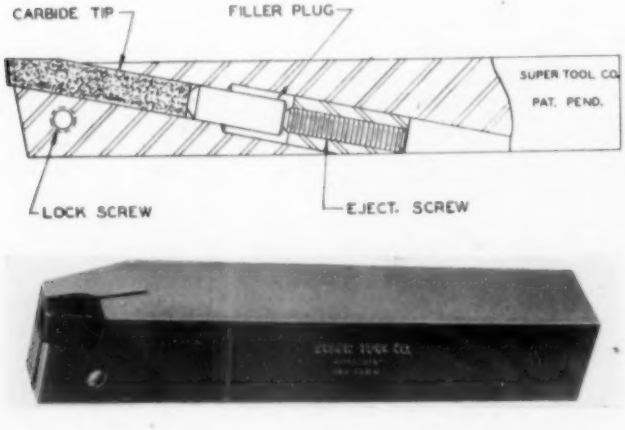
Two larger presses of similar design, rated respectively at 80 and 150 tons capacity, are currently being developed by the maker. It is to be expected that these presses which are a product of the Alpha Tool Works, 6464 Beechton, Detroit, will become highly popular throughout the die and stamping industries. Certainly, a press that not only permits of easier final corrections, but accurately indicates whether properly made, should have a wide appeal.

New Lathe Tool Promises Great Savings

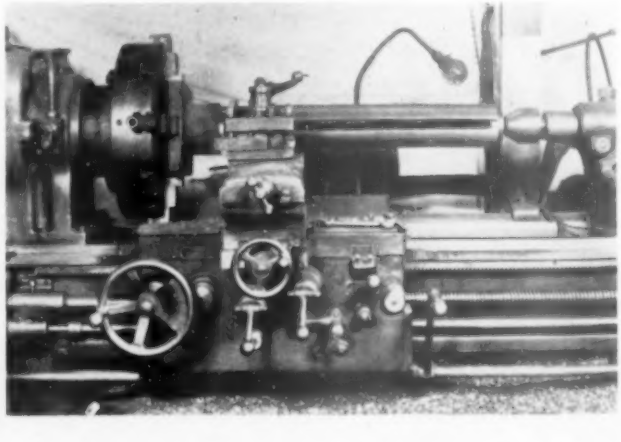
IF CURRENT TESTS under unusually severe conditions may be taken as a standard of performance, a new ejector type carbide tool, by Super Tool Company, Detroit, promises marked economies in metal processing. Indicative of performance is the machining of cast iron columns 7" diameter x 48" long, having a 1¼" slot running lengthwise.

The work was performed on a heavy duty lathe, and notwithstanding the interrupted cut and the consequent shock factor, the diameter was reduced to 6 inches in one operation, using the ejector type tool. Previously, brazed tipped tools had been used; and, so that actual comparisons may be made, the following data is submitted:

	Brazed tip tools	Ejector type tools
FEED PER REVOLUTION	.035	.051
PRODUCTION PER GRIND	1 to 1½ pcs.	5 pcs.
TOOL BREAKAGE	40%	0
SAVINGS IN TOOL COST		600%



The ejector type tool, shown in inset, provides for secure holding of the solid, replaceable carbide bit without applying undue stresses. In resharpening, the carbide bit is extended by simply turning the recessed ejector screw. With the carbide bit thus extended, it can be ground without bringing the carbide wheel in contact with the steel holder.



Drilling and Boring Tools

Installment No. 11 of a Series

As stated and illustrated in the preceding installment, it is essential that, to bore straight holes, the entire axis of the cutting tool holder must be in dead alignment with the center line of the spindle. That is, for such tools as reamers and piloted boring bars. If misalignment occurs, the tool will "climb" and cut a taper and oversize hole. In the case of single point, carriage fed boring tools, feed must be absolutely parallel with the axis of the spindle to assure a straight hole.

As previously stated in this series, precision is a relative term. Thus, a bored hole which may be subsequently reamed, finish bored, ground or honed may have limits of tolerance stated as ± .010", and this may be assumed to be precision for the particular requirement. Subsequent operations may range from ± .001" for reaming and ± .0001" for grinding to ± .0005" for honing. The degree of obtainable accuracy is largely determined by the accuracy of the machine used—e.g., a highly specialized precision boring machine can usually be depended upon to produce consistently accurate holes.

For production purposes, however, one does not neecssarily require a precision machine to produce precision holes. Given properly designed fixtures, cutting tools and accessories, and a driver with sufficient power, one can produce accurate holes regardless of spindle play or loose carriages. And these tools need not be complicated nor overly expensive. For example, one may have a boring job in which the limits of tolerance are stated as ± .001", and the only available machine may be a heavy duty turret lathe which, because of age, abuse or severe service, may be anything but accurate. A typical example of tooling for such a job is shown in Fig. 1.

If there is only nominal play in the spindle, and if the turret and turret slide are reasonably tight, one can use a single pilot bushing with expectancy of sustained accuracy within the limits of tolerance specified. On the assumption that the turret holes may be out of line with the spindle, however, one provides an aligning tool holder to compensate for misalignment.

By making the holder in two parts, one of which floats laterally on the turret face and which is provided with a concave "dish," and the mating part with a convex face, one can shift these until the shank end of the bar is dead in line with the center of the spindle. The radii of the mating surfaces should be as R^1 or R^2—i.e., the arc of radius should be from the front of the pilot bushing to the mating joint with the cutter at approximate start of cut.

In line with previous recommendations, a rotary pilot bushing is used, although a plain bushing may be used if the other is not available. For excellent reasons, however, the rotary bushing is preferred for long run production jobs. For one thing, there is no rotary rubbing, between pilot and bushing, to cause wear. As both pilot and bushing turn together, the only wear will be such as occurs from end motion—and this is usually negligible. Also, because both turn together, the fit between pilot and bushing can be very close (practically a plug fit) and this both enhances and maintains initial accuracy.

Assume, however, that there is more than ordinary play in both spindle, carriage and turret, then a double pilot is in order for accurate results. There are several ways of applying in-line pilot bushings; one way, for example, incorporates the leading pilot bushing in a holding fixture, or, it may be located in an overarm from the spindle head. Fig. 2 shows alternate methods; at top, a plain bushing is shown in an overarm attachment; at bottom, a rotary bushing ostensibly located in a fixture. Since the bar does not turn, it is obviously unnecessary to use a rotary bushing in the overarm; in the case of a fixture, however, the rotary bushing provides the advantages previously stated.

When using rotary bushings—or plain bushings, for that matter—they can be incorporated either in the spindle or in the center hole of the chuck, whichever is preferred. One may have to use adapters, which would preclude boring out the holes to fit. In any event, the bushing must be far enough from the end of the cut to clear chips.

With the double pilot, it is necessary to use a floating tool holder since, if the boring bar is held rigidly, it will tend to bind as the cut progresses. The spring of the bar would then throw the bore out of true. It must be remembered, in this connection, that the machine acts nominally as a driver or power tool, and the accuracy of the work results from the fixture and cutting tool, not from the machine. To simplify explanation, the workpiece in the illustration is shown held in a 3-jaw chuck.

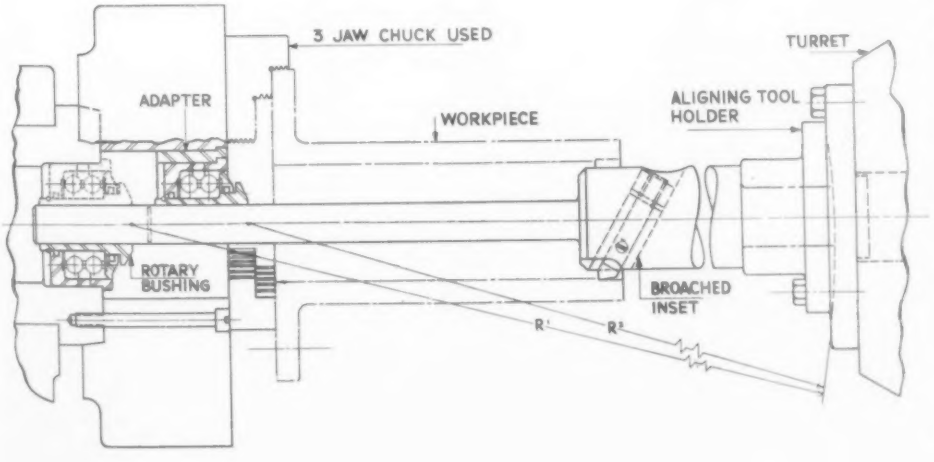


FIG. 1

In Fig. 3, we have a variation of the same job. Here, however, the boring is done in a vertical drill press which, as in the case of the turret lathe, merely serves as a power tool or driver. For the floating holder, one can use a "Magic" type chuck, the detachable member of which may be ground slightly undersize to provide more float. Provision may have to be made to swing the work from under the spindle, for removal of the bar. Here, of course, the bar turns in both bushings; consequently, rotary bushings are in order for the reasons previously stated. With but slight modifications, the same boring bar is used in the three alternate setups, about the only difference being in the holder or driver.

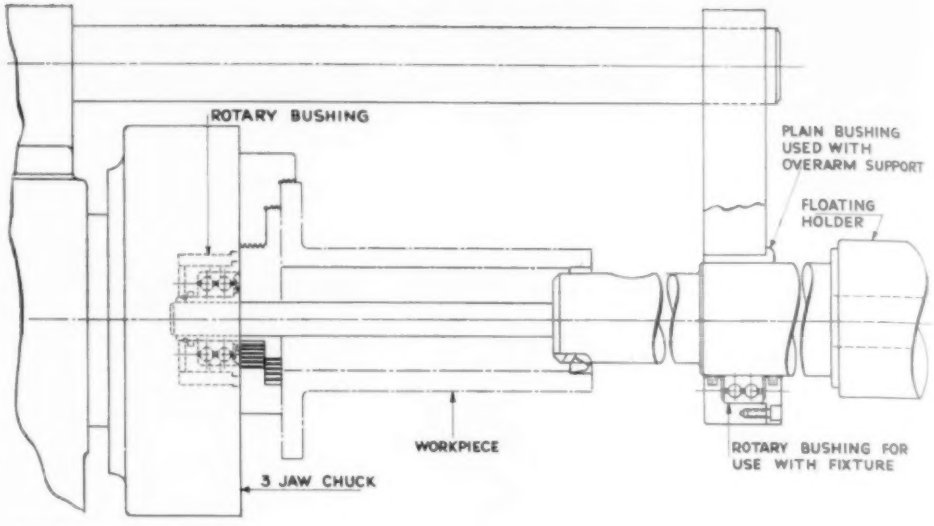
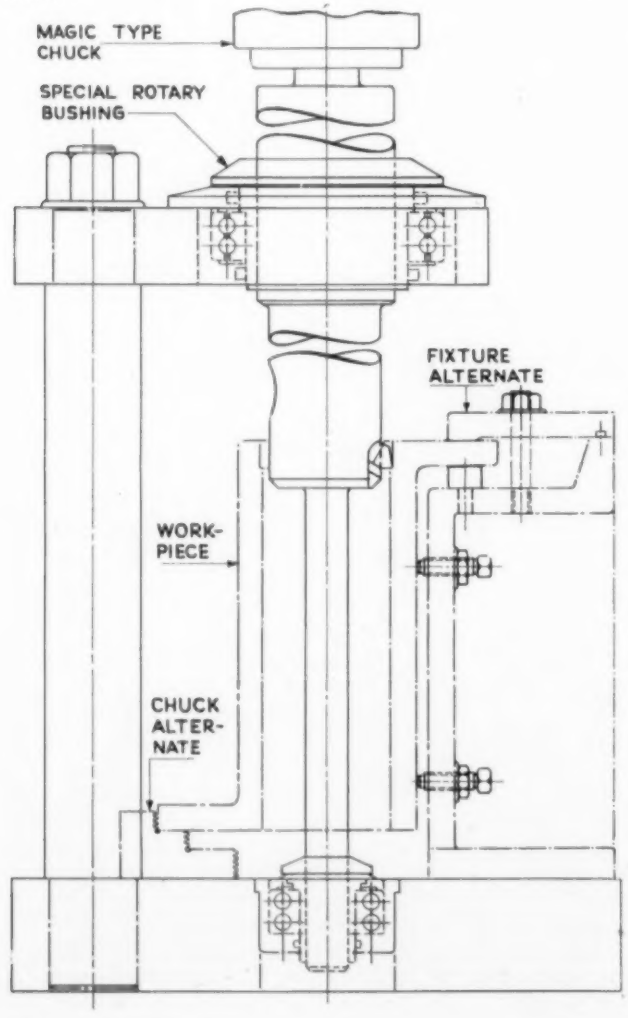


FIG. 2

It should be pointed out, here, that the illustrations are more or less schematic and intended to convey methods of doing rather than to show design. For example, there are several "wrongs," in the drawings, that are readily apparent to the experienced tool engineer; however, these were purposely incorporated, partly for purpose of simplification and also because explanation serves a useful purpose. In this connection, a good motto for the beginner—and for the veteran as well—is this. Don't make the same mistake twice.

FIG. 3



One of the "wrongs" is in the method of holding the workpiece. Because of its length, it should be held in a fixture, not in a chuck. If held in a fixture, it would be supported at the end, thus reducing vibration and the tendency to crowd away from the tool, a condition that is inherent with long, thin walled and unsupported work. If, however, the part is to be chucked, it is preferably clamped on the O.D. of the flange, since such chucking creates the least distortion. If gripped on the opposite end, the walls would tend to distort under clamping pressure, resulting in out-of-roundness.

In Fig. 3, a suggestion of a fixture is shown to the right of the center line while, at left, the workpiece is shown held in a chuck which, in turn, is bolted to the table of the drill press. The part could be held down against a plate by means of a clamp, with location by means of a Vee or two pins which would serve as approximate locators. If so held, the flange would have to be faced before boring.

Regardless of the method used for holding the workpiece, however, the main consideration is that, with two bushings in line, and with the pilots of the bar a close fit in the bushings, the tool will cut straight and will produce a straight and round hole. This does not mean that holding is not important; however, we will show the same job properly tooled in the next installment. Right now, we'll dispose of the illustrations as they stand.

With regard to the boring bar, it can be assumed to be correctly designed as shown. The large diameter is somewhat larger than the bore, which permits the cutting tool to clear when passed through the larger bushing. A disadvantage of this design is that the bar must be long enough so that the large diameter does not enter the bore. An improvement will therefore be shown, in the coming installment, along with improved fixture design.

One thing should be explained here; that is, that several tools are used—say one for roughing, one for semi-finish and one for finish. The first would take a considerable cut, the second would leave about .010" for finishing, to be cleaned up in the final cut. In each case, single point tools would be used, and as all would be identically piloted the semi-finish and finish tools would successively reduce errors produced by the preceding cutter. If machined on a turret lathe, three bars would be mounted in the turret; if machined on a drill press, three interchangeable bars would be used, the shank of each of which would fit into the floating holder or driver.

End of Part 11, this series. Installment No. 12 will follow in the July issue, The Tool Engineer.

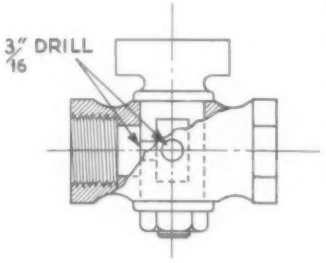
GADGETS

Ingenious Devices and Ideas to Help the Tool Engineer in His Daily Work

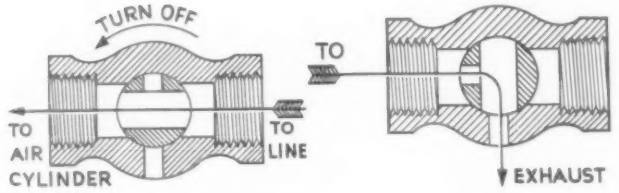
Emergency Air Valve

REQUIRING A 2-WAY air valve for use with an air cylinder and having none available for a rush set-up, one was quickly made by using a gas shut-off cock, altered as shown. When valve is in closed position, drill one hole through end (to be connected to air cylinder) to opening in valve and one hole through outside of casting on one side.

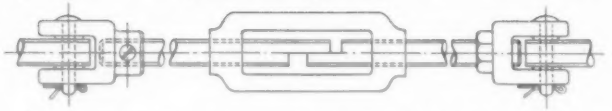
Diameter of drill should be approximately one-half the width of the opening in valve, i.e. cock used was ½" pipe size, width of opening—3/8", diameter of drill—3/16", thus leaving ample bearing surface on either side of holes to prevent air escaping with valve in open or closed position. An extension handle fastened to top of valve facilitates operation. A water shut-off cock with drain can be used to better advantage as it requires no alteration.



H. W. Billard
Hempstead, N. Y.



Quick Adjusting Turn Buckle



THIS "GADGET" is a conventicnal turn buckle, in which the threaded rod ends have been flatted, as shown, to prevent turning during adjustment. While this treatment weakens the rods, so that they might twist under heavy strain, they will serve for prdliminary tightening. After that, some care will be required for the final tightening.

Frank J. Peragine
Greater N. Y. Chapter, A.S.T.E.

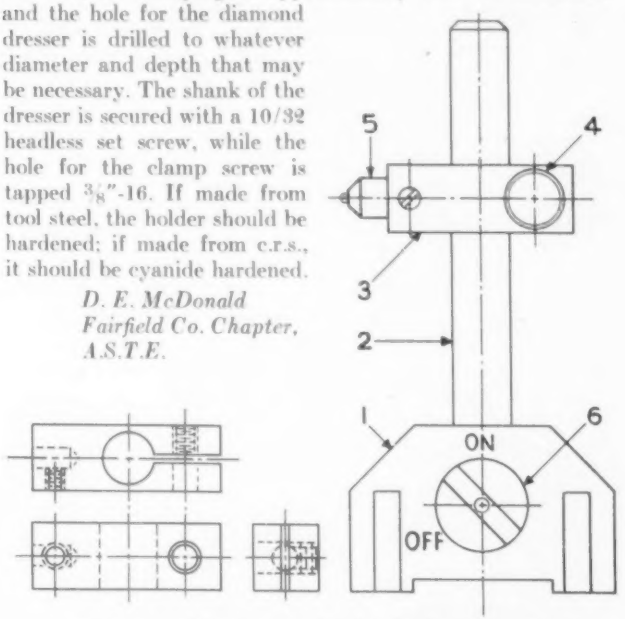
Grinding Wheel Dresser

A SIMPLE and inexpensive fixture, to be used for dressing grinding wheels, is herewith illustrated. This fixture is very flexible and can be adapted to most all types of machines. When the fixture is placed on the table the switch is turned on, and the magnetic flux developed is sufficient to securely hold it in place. By adjusting the longitudinal feed as the table is traversed to and fro, a very satisfactory dressing job can be accomplished.

In the drawing, Detail 1 represents the base of a Brown & Sharpe magnetic base and upright. Det. 2 is the base column; Det. 3 the diamond holding fixture (or attachment, shown in detail); Det. 4, a conventional knurled head thumb screw; Det. 5, the diamond dresser; and Det. 6 the conventional on and off switch.

The fixture (Det. 3) is made from a piece of 1" square steel 2" long. The main bore, which is intersected by a 1/16" saw cut, for clamping, is approximately .740" in diameter, and the hole for the diamond dresser is drilled to whatever diameter and depth that may be necessary. The shank of the dresser is secured with a 10/32 headless set screw, while the hole for the clamp screw is tapped 3/8"-16. If made from tool steel, the holder should be hardened; if made from c.r.s., it should be cyanide hardened.

D. E. McDonald
Fairfield Co. Chapter, A.S.T.E.



Self Tightening Threads

IN INSTANCES WHERE it is required that a thread fit snugly, as with a stud; or where it is advantageous that a thread tighten with increased engagement, tolerances can be liberalized and production increased considerably by using taps with a deliberate plus or minus lead error of from two to three thousandths per inch.

Taps with the desired lead error can readily be produced on a thread grinder where it is only a case of computing the proper gearing for the lead desired. Since grinding facilities are not always available, adequate taps can be produced on a lathe, either with or without eccentric relief. By offsetting the tail stock and adjusting the taper attachment correspondingly—that is, the lines of travel would be parallel to produce a tap with a straight thread (some back taper is desired of course). The lead would be shortened relative to the relationship between the tangent and the sine of the angle of the offset. The advantage thus obtained would be evident in the use of the standard change gears.

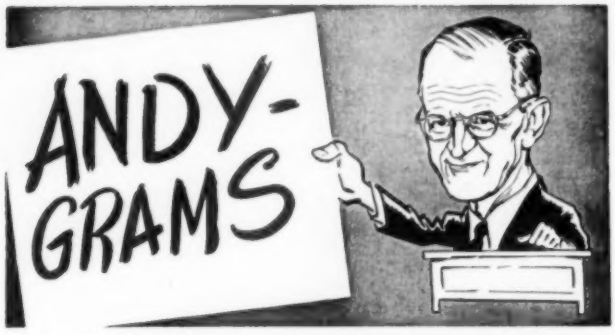
It is possible that lead variations in a greater or lesser extent would prove advantageous in particular instances, and for varied purposes.

Edwin C. Austin,
Falls Church, Va.

Cut Glass With Shears

ORDINARILY, one would not think of cutting glass with shears; however, it can be readily done by immersing the sheet in a tub of water—say a washtub, which leaves room in which to manipulate the shears. The water dampens the vibration and the glass then shears easily. If curved lines are to be followed, the sheet can be painted and the outline scribed on. Outside curves can be cut with straight shears; for inside curves, however, curved blade shears are required.

Contributed.



OVER THE WEEKEND, had a pleasant and, from the viewpoint of things accomplished, a rather profitable session with my 18,000 bosses, as represented by the Nat'l Editorial Com'tee. In addition to the Com'tee body, from which Herb Tigges was unavoidably absent, those present included Prex Peirce, Harry Conrad, Charley Hasse, 1st V.P. Irwin Holland (who has the Com'tee under his wing), Bob Powers, and y'rs truly as the (sometimes) silent observer.

Y'know, it's one thing for me to put in my time on *The Tool Engineer*—I'm paid for it—but the boys on the Committee hold responsible positions and, owing first allegiance to their employing companies, attend these meetings at considerable personal sacrifice. Yet, leaders stand out from the crowd, and personally I rather suspect that the employers are well pleased at the recognition of personal qualifications for important committee work. This would hold true for all A.S.T.E. committees, the membership of which is skimmed from the top cream of recognized leaders.

While I have but recently become acquainted with some of the members of the Editorial Com'tee, I have known W.B. (Mr., Mac, Bill or Slim, according to how well you know him) McClellan ever since joining the Society—in fact, have been associated with him on several committees. A worker from the word go, Slim is one of the most popular men in the Society and I don't imagine his shadow will wane any with the passing of time.

I've known Ken Jasper and John Lapham several years, and while acquaintance with Herb Tigges, Foster Koehn and Mike Radecki is somewhat briefer, their work has been impressive and, like that of Irwin Holland, indicative of outstanding executive ability. Holland, incidentally, is a veteran on the Com'tee, having been Ch'man several years ago. A recent addition to the Com'tee is Anton Peck, from the Coast, of whom I'd heard a lot of favorable comment and whom I had the pleasure of meeting at the recent Annual in Houston.

Now, I'm not handing out bouquets with the idea of ingratiating myself with what may be termed my bosses. In that connection, I'm one of my own bosses, as a member, and realize full well that I hold my job on merit, not on favoritism. If I can't produce, someone else will. Rather, I've mentioned these men as I have mentioned others who, in my belief, have contributed materially to the progress of the Society and to its publication. What we have in a magazine, and what we are going to have, is largely due to the work of the men on the Editorial Committee. It is to their credit that the results have been good.

One thing suggested was that we run a page devoted to "Letters to the Editor," so if you boys North, East, West, South have any bouquets to hand out, or any gripes to air, let's have 'em. So far, we've had very little panning, but criticism will be welcome provided it's constructive. In this connection, we've had a lot of good suggestions from the questionnaires—"What I like to read in *The Tool Engineer*"—although, on the whole, the returns seem to hold consistently as regards reader preference. We're slanting our editorial contents to suit majority demand.

Now, as the book goes to press, with the Column reserved as a final chore, I view with trepidation an accumulation of releases on new tools that, spread out as we've been going, would last a year or more. And they just keep coming in. So, starting with the July issue, we're going to run the popular Tools of Today section in 3-column spreads instead of the usual two, thereby giving us a chance to catch up on a mounting backlog. You'll have the same information, only more of it, especially so since other departments may have to be "streamlined" until we can reduce accumulations.

One thing about my job, there's never a dull moment—and mighty few without interruptions. I was just in the middle of this writing when Cornelius Lowell, Principal of Drafting and general pinch hitter at Wilbur Wright Trade School, walked in a day ahead of schedule a/c a talk I'd promised to give his boys on welding techniques. Anyway, I grabbed my props in a hurry, went over and did my stuff, and let me tell you that these boys in vocational high schools are very much on the beam. The questions asked were serious and of a nature that would have reflected credit to matured men. Personally, I've a world of faith in the younger generation. They're real folks.

T'other day, had a pleasant visit from H. I. (Hank) Bouchard, erstwhile of Woonsocket and way stations along the Blackstone river but now located in New York City, where he operates a sales agency. Seems that Hank knows about everybody that I know or used to know around New England—the Ames brothers, Warren and Ira; the old gang at Taft-Peirce, including Joe Conley, Walter Bennet, Al Lavallee, Gus and Fritz Hoberg (wonder does Fritz still toot a cornet?); Tingley of Federal Products and so on through a list that, by now, must be reduced by old timers who have passed on to final inspection. But, *auld acquaintance* are not forgot.

Home, they say, is where the heart is, by token of which I should rate many homes a/c my thoughts often turn fondly to past scenes. True, my affections center on my home and family, yet, I cherish old friendships and find the memories of the past entirely pleasant in retrospect. Oh sure, there have been dark moments, but the shadows have a way of paling with the passing years. Anyway, I prefer to bask in recollection of the sunny days—it's easier on the system.

Had a letter from Bill Young, in which he extended an invitation to speak at the September meeting of Boston Chapter. Well, I'll certainly feel at home in Boston, and I'm particularly pleased that the welcome sign is out a/c this will be a "repeat" and, as I've remarked before, I hang no medals on my manly bosom as a speaker. Nothing like being honest with oneself, y'know. However, I've been stalling off a trip to the East for some time, and the invitation provides opportunity for promised visits to New England plants that, because of pressure of work, have been long deferred.

Right now—or as soon as I've finished this chore—I'm hieing to Aurora, Ill., having promised Roger Waindle these many moons that I'd visit the Sapphire Products Div'n of Elgin National Watch Company. Along with that, I've a few other visits to make, apropos which I'll probably come back with *beau coup* material for stories some of you boys North, East, West, South have been needling me for. We aim to please.

ASTEely Yours,

Andy

Convention Committee Lines Up Boston Program

New England Chapters to Cooperate in Fall Meeting Arrangements

WELL-ORGANIZED and rapidly nearing completion, plans for the ASTE Fifteenth Semi-Annual Meeting at Boston, Mass., October 30-November 1, have been announced by Robert W. Ford (Pittsburgh), National Program Chairman, following a recent meeting of his committee at Hotel Statler, Boston.

An innovation in national meetings of the Society will be the separation of plant tour and technical session schedules, no competitive events running concurrently with the speaking program. This arrangement will permit everyone present to participate in all the activities.

Abrasives, First Topic

As now established, the first technical session, opening at 2:00 p. m., Thursday, October 30, will be a discussion of "A New Concept in the Field of Abrasives—32 Alundun," sponsored by Norton Co., Worcester, and chairmanned by G. A. Rogers (Montreal). In the evening H. E. Linsley (Northern New Jersey) will conduct a study of "Welding as Related to Jigs and Fixtures," presented by General Electric Co.

Friday's subjects include "Material Handling" in the afternoon with E. W. Baumgardner (Cleveland) in charge, and "Bearing Applications" in the evening with A. A. Nichols (Boston) as chairman. "Tooling for Watches and Small Instruments," headed by J. O. Horne (Rochester), will wind up the technical meetings on Saturday afternoon.

In addition to Mr. Ford and the technical session chairmen, National Program Committeemen working on the convention are: F. J. Schmitt (Chicago), Second Vice-Chairman; A. D. Lewis (Los Angeles), and C. H. Peters (Louisville). Mr. Baumgardner serves as First Vice-Chairman and Mr. Horne as Secretary of the Committee.

To Visit "Old Ironsides"

An interesting and diversified schedule of plant tours has been lined up for each morning of the three-day meeting. Thursday there will be a choice of visits to Chelsea Clock Co., Chelsea; Boston Gear Works, Inc., North Quincy; Polaroid Corp., Cambridge; W. H. Nichols & Sons, Waltham; Ford Motor Co. Assembly Plant, Somerville; and the U. S. Naval Shipyard, Boston. The latter includes a tour of the renowned War of 1812 frigate *Constitution*, better known as "Old Ironsides."

Two General Electric plants at West Lynn and the Norton Co. in Worcester are among Friday's plant visitations. The Ford, Nichols and shipyard trips will be repeated. Massachusetts Institute of Technology at Cambridge and Pneumatic Scale Corp., Ltd., North Quincy, will be open for inspection Saturday morning.

An optional program of educational motion pictures will be offered each morning at convention headquarters in Hotel Statler. The Board of Directors will convene Friday afternoon and again on Saturday morning. Saturday evening has been reserved for the Semi-Annual Dinner.

Provision is being made for an attractive program of ladies' activities, such as sightseeing, social events and visits to food processing, soap and confectionery plants.

Pre-registration of early arrivals and local members on Wednesday evening will relieve the opening rush Thursday morning, giving everyone an opportunity to register before the first plant tour.

All New England Chapters are assisting Boston in physical arrangements for the convention, with A. A. Nichols of the National Program Committee and a Past Chairman of Boston Chapter, as Host Chapter Chairman.

Heading the various committees are: W. W. Young, Technical Program; W. F. Jones, Plant Tours; H. J. Richards, Registration; John Sylvester, Films; J. C. Ewer, Meetings; J. P. Crosby, Social Program; J. F. Topham, Banquet; W. E. Winfrey, Reception; R. I. Robbins, Transportation; J. W. Geddes, Emergency; J. L. deVou, Jr., Arrangements and Meetings; W. C. Swanson, Records and Reports; L. A. Sheeran (Little Rhody), Signs; Paul Davis, Public Relations; K. F. Thomas (Hartford), Tickets; A. L. Potter (Springfield, Mass.), Entertainment; and A. J. Leone, Budget.

The effectively developed program and Boston's perennial appeal as a tourist city, together with the large concentration of Society membership in the Northeast, are expected to pull a heavy attendance at the Society's first national gathering in The Hub.

Where Modern Boston Crowds the Ancient

Innumerable points of historical interest await visitors to ASTE fall Semi-Annual Meeting, in this section of the three-century-old Massachusetts capital. Overlooking Boston Common (left) is the gold-domed State House on Beacon Hill. Other landmarks visible in photo include the Custom House Tower, Old North Church, Old Granary Burying Ground, Federal Building and Old South Church. Beyond is the harbor

Board Studies Society Operations, Plans

IN A SPECIAL meeting of the ASTE Board of Directors at Detroit, April 19-20, Society operations for the remainder of the current fiscal year and problems confronting the incoming Board at their installation next October were discussed in detail.

Presiding officer at the two-day meeting was W. B. Peirce, Society President and Chairman of the Board.

Because of high labor costs and mechanical difficulties involved in printing a Society roster under present conditions, the Board voted to suspend publication of the ASTE Directory for 1948.

Cost of operations of *The Tool Engineer* was closely analyzed and I. F. Holland, First Vice-President; W. B. McClellan, National Editorial Chairman; and H. E. Conrad, Executive Secretary, were appointed a special committee to work with R. B. Powers, Executive Editor, with a view to economizing wherever possible in production costs of the magazine.

The success of the regional meetings in which groups of Chapters participated during the past year warrants their continuance, the Board decided.

A surprise feature of the meeting was

the presentation of a jeweled Past President pin to A. M. Sargent. The emblem, a gift of Baltimore, Central Pennsylvania, Northern New Jersey, Philadelphia, Potomac, and Williamsport Chapters, was presented by Director-Elect T. J. Donovan, Jr., who commended Mr. Sargent for his efforts and achievements during his administration, expressing the Chapters' appreciation and admiration.

The second day's session was devoted entirely to a discussion between the Board and National Committee Chairmen concerning objectives and problems of the various committees. Important among these is the Membership Committee's program for increasing membership to 25,000 during the next two years.

National Committee appointments announced at the meeting are as follows: Constitution and By-Laws, J. J. Demuth (St. Louis), Chairman; E. J. Berry (Little Rhody), E. W. DeBisschop (Rochester), C. F. Staples (Pontiac), A. R. Gieringer (Milwaukee), D. R. Linch (Los Angeles), and P. A. Rickrode (Central Penna.)

* * *

Editorial, W. B. McClellan (Detroit), Chairman; K. C. Jasper (Louisville), F. C. Koehn (Milwaukee), M. J. Radecki (New Haven), H. L. Tigges (Toledo), J. A. Lapham (North Texas), and Anton Peck (Los Angeles); Education, O. W. Winter (Buffalo-Niagara Frontier), Chairman; Committee members to be announced; Finance, G. A. Goodwin (Dayton), Chairman; L. L. Weber (Cincinnati), Vice-Chairman; J. L. Webster (Northern New Jersey), H. R. Nelson (Chicago), A. A. Carlson (Evansville), and V. H. Ericson (Worcester).

Handbook, E. W. Ernst (Schenectady), Chairman; F. W. Wilson, Handbook Editor, B. C. Brosheer and Frank Martindell (Chicago), Harry Crump (Detroit), F. W. Curtis and A. L. Potter (Springfield, Mass.); and R. B. Douglas (Montreal). Judicial, J. A. Siegel, Chairman; T. B. Carpenter, F. A. Shuler, W. H. Smila, and W. F. Wagner (Detroit), F. W. Curtis and J. R. Weaver (Springfield, Mass.), A. H. d'Arcambal (Hartford), and R. M. Lippard (Worcester). Honor Awards, same personnel as Judicial Committee.

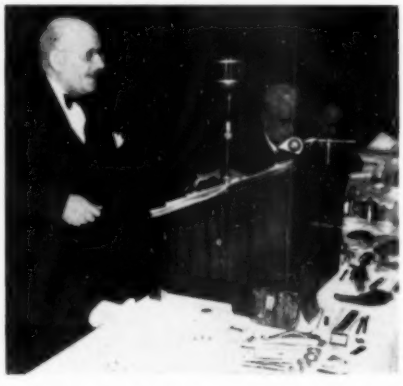
* * *

Membership, H. F. Volz (Columbus), Chairman; F. J. Dawless (New Haven), Vice-Chairman, H. A. Bachman (Detroit), L. M. Cole (Houston), E. W. Dickett (Rockford), J. I. Junkin (Louisville), J. O. Knight (Peoria), G. A. Exley (Baltimore), H. D. Mozeen (Syracuse), M. M. Ross (Wichita), C. J. Lindegren (Worcester), and W. W. Appleton (Toronto). Program, (listed on previous page in convention story).

Public Relations, H. B. Osborn, Jr. (Cleveland), Chairman; H. E. Campbell (Cincinnati), R. E. Crawford (Toronto), W. J. Gamble (Buffalo-Niagara Frontier), H. H. Whitehall (Hamilton), and W. F. Sherman (Detroit); Standards, W. H. Smila (Detroit), Chairman; E. J. Marasko (Cleveland), Vice-Chairman; L. B. Bellamy, William Moreland, W. F. Wagner and G. S. Wilcox, Jr., (Detroit), and W. A. Thomas (Windsor).

Attendance at the meeting included all National Officers and present Directors, except T. P. Orchard; Directors-Elect H. L. Tigges and C. V. Briner, all National Committee Chairmen (National Program Committee represented by E. W. Baumgardner, First Vice-Chairman), and H. E. Conrad, Executive Secretary.

President W. B. Peirce (center) is met at Union Station by Columbus Chapter Chairman W. E. L. Bock left) and National Membership Chairman H. F. Volz. Group studies Chapter program in which Mr. Peirce is to participate as speaker



E. Von Hombach, of Carpenter Steel Co., tells Chicago members about working of stainless steels. Display shows products in daily use

Entertains President

Columbus, Ohio—W. B. Peirce, ASTE President and Vice-President of Research and Development, Flannery Bolt Co., Bridgeville, Penna., was a guest at the April 9 meeting of Columbus Chapter.

Speaking before approximately 60 members and guests, Mr. Peirce outlined his administrative program and announced his Committee Chairmen, including Howard E. Volz, a local member who has been named National Membership Chairman.

Professor W. G. Stanton, Associate Professor of Industrial Engineering, Ohio State University, addressed the assembly on "Engineering Economics." His talk opened new vistas in this phase of engineering.

Expert Tells When, How To Use Stainless Steels

Chicago, Ill.—E. Von Hombach, Research and Development Engineer for Carpenter Steel Co., Reading, Penna., gave approximately 150 Chicago members valuable "Tips on Application and Fabrication of Stainless Steels" at a dinner meeting April 7 in the Furniture Club of America.

Mr. Von Hombach in his lecture gave a wealth of information and data concerning turning, drilling and tapping of stainless steels. Cutting angle effects on various tools and results obtained were explained.

The speaker also displayed an extensive collection of stainless steel articles in everyday production.

C. B. Cole, National Director, reported briefly on the Annual Meeting.

Tooling Abuses Reduce Turret Lathe Production

Kansas City, Mo.—In a nationwide survey, not more than half of the turret lathes studied were found to be producing to capacity, through one or more preventable violations of tooling practices, E. L. Murray, of the Sales Engineering Dept., The Warner & Swasey Co., Cleveland, Ohio, told Kansas City Chapter members during a lecture on "Fundamentals of Turret Lathe Practices."

Mr. Murray, speaking before the Chapter's April 12 meeting in the Pine Room of the Fred Harvey Restaurant, enumerated five phases in the profitable use of machine functions: 1. Proper outline of tooling functions; 2. Proper types of durable and perishable tooling;; 3. Selection of proper type and size of machine; 4. Proper use of machine elements; and 5. Maintenance of machine accuracies by proper care, cleaning and lubrication.

These phases, the speaker added, are by no means limited to turret lathe practices.

At the conclusion of his talk, Mr. Murray showed the sound film, "Chips." The motion picture, a high speed camera production, revealed what happens when the tool contacts the work in the lathe chuck.

Other News In This Issue

Chapter	Page
Akron	58
Atlanta	54
At Large	52
Baltimore	57
Boston	55, 56, 59
Buffalo-Niagara Frontier	57, 60
Dayton	60
Elmira	54
Erie	58
Flint	51, 58
Fort Wayne	53, 57
(Grand Rapids) Western Michigan	53
Hamilton	59
Indianapolis	59
Kansas City	54
Milwaukee	58, 59
(Minneapolis) Twin City	56
Montreal	52
(Newark) Northern New Jersey	54
New Haven	56
Philadelphia	55, 60
Pittsburgh	51
(Poughkeepsie) Mid-Hudson	57
Richmond	58
Rockford	52
San Diego	57
(San Francisco) Golden Gate	53
Seattle	54
(St. Catharines, Ont.) Niagara Dist.	56
St. Louis	51, 57
Syracuse	52, 60
Toledo	51, 53, 58
Toronto	55
Coming Meetings	60
Obituaries	59
Situation Wanted	55

Educator Names Qualities Needed by Tool Engineer

Pittsburgh, Pa.—Inherent aptitudes, acquired skills and natural qualities essential for the development of the student tool engineer were set forth by Dr. J. W. Fleming, Director of Vocational and Industrial Arts Education for the Pittsburgh Board of Education, in an address, "Education Through Tool Design," given before the April 4 meeting of Pittsburgh Chapter in the Fort Pitt Hotel.

Among qualifications necessary for success in this field, Dr. Fleming named: Ability to visualize the job in its various stages prior to its construction and to interpret specifications intelligently; cooperation and moral responsibility in working with others; mechanical skills and, of course, mathematics and science.

The tendency of technical schools and engineering colleges to scrap their shop equipment was deplored by the speaker as depriving future engineers of valuable shop experience.

President W. B. Peirce spoke briefly and R. W. Ford was recognized for his appointment as National Program Chairman. W. H. Schott, Chapter Delegate and Past Chairman, presented the National Membership Trophy awarded to Pittsburgh Chapter during the Houston convention.

About 75 members and guests attended the dinner meeting.

Pioneers Forged Way For Bushing Standards

Flint, Mich.—Development of standard drill jig bushings has been accomplished during the past 30 years, R. F. Holmes, Sales Manager for Universal Engineering Co., Frankenmuth, pointed out to 151 Flint Chapter members and guests in a technical talk before the April 17 meeting at Fischer's Hotel in Frankenmuth.

The initial step in this direction, Mr. Holmes recalled, was taken by the Wright-Fischer Engineering Co. of Detroit, organized in 1918. Standards formulated by this company were the first approach to the set of standards now fully accepted by industry and its customers, he added. Complete standardization was finally achieved through the efforts of the five principal companies then in the business, working with the American Standards Association to develop the now-standard bushings accepted by ASA in 1935.

Standardization of bushings, the speaker continued, simplifies the user's problem. His inventory is eliminated for standard bushings can, in most cases, be secured on an overnight basis if necessary. The many advantages of standard bushings enable the tool engineer to materially reduce his tooling costs and eliminate production delays.

At the conclusion of Mr. Holmes' talk, the group visited the Universal Engineering Co. to view plant operations. Since the 8,000 items of drill jig bushings made there are not sold in the same proportion, production must be set up on a basis as low as ten pieces for some types and as high as thousands in the most popular models.

In addition to bushings the engineers observed also operations in the manufacture of collets and collet chucks, floating chucks, boring chucks, standard flush bushings and pins, boring bars, grippets and wedge lock vises.

A member of Universal Engineering Co. staff explains operation in honing of drill jig bushings to Flint Chapter group during plant tour

Pittsburgh's retiring and incoming Chairmen chat with J. I. Karash of Reliance Electric and Engineering Co., speaker at the installation meeting. From left: W. H. Schott, 1946-47 Chm.; Mr. Karash, and P. H. Magnus, Chm. for 1947-48

Peirce on Western Tour

Pittsburgh, Penna. — W. B. Peirce, ASTE President and Vice-President in Charge of Research, Flannery Bolt Co., Bridgeville, is making an extended tour of western Chapters of the Society.

His first stop is at Denver, Colo., June 12, to charter a new ASTE Chapter in that city. The remainder of his Society itinerary is as follows: Seattle, Wash., June 21-22; Portland, Ore., June 23-24; Golden Gate (San Francisco, Calif.), June 28-29; Los Angeles, July 2-6; San Diego, July 7; Phoenix, Ariz., July 8; and Wichita, Kans., July 9.

Mr. Peirce will familiarize himself with problems encountered by these distant Chapters and will acquaint them more fully with the functioning of the organization.

Lathe Practice Principles Frequently Overlooked

St. Louis, Mo.—In 80% of all shop problems, one or more of the 12 fundamental principles of good turret lathe practice are neglected or forgotten, E. L. Murray, Manager of the Estimating Div., The Warner & Swasey Co., Cleveland, Ohio, charged in a talk before St. Louis Chapter, April 3, in the Claridge Hotel.

Mr. Murray's discussion of turret lathe practice included speeds, feeds, cutters, tool position, and machine maintenance. Following the lecture, the sound film, "Chips," showed in slow motion many of the points presented by the speaker.

Among the 138 members and 18 guests attending the meeting were four new members who were inducted during the business session.

Toledo Membership Drive Adds 68 to Roster

Toledo, Ohio—Through an efficiently-planned and executed membership drive conducted by Val G. Kessler, Membership Chairman, Toledo Chapter has added 68 new members in one year.

As the first step in the campaign, letters of invitation were issued to likely prospects. The invitations were followed up by personal contact through distribution of the prospect list to the entire membership. A checklist of current membership was also furnished.

Coordination was effected through the appointment of 45 company membership chairmen who directed the membership activity in their respective business organizations.

Printed progress reports were included in mailings of meeting notices from time to time, giving up-to-date membership data and listing prospects from whom applications had been received.

As a result of this Chapter-wide program, the group started the new season with a net membership of 311.

Mr. Kessler, who continues in office as Membership Chairman and Chapter Second Vice-Chairman, expects even greater progress this year in building Society membership in the Toledo area.

Safety Devices Important In Punch Press Die Design

Pittsburgh, Penna.—Joseph I. Karash, Plant and Process Engineer of the Reliance Electric and Engineering Co., Cleveland, Ohio, gave Pittsburgh members an informative account of advanced methods in die design to fully utilize the many possibilities of the punch press.

Mr. Karash was the technical speaker at a recent meeting in the Fort Pitt Hotel, attended by 118 members and guests. In his slide-illustrated talk, the speaker urged incorporating in die design and setups the ultimate in safety devices to protect the operator.

At the conclusion of his lecture, Mr. Karash conducted a question and answer period.

During the meeting new officers were installed, and Frank T. Boyd, 1946-47 Membership Chairman, was congratulated by retiring Chairman W. H. Schott for his outstanding efforts which resulted in the award of the Society Membership Trophy to Pittsburgh Chapter.

Standards Secretary To Visit Chapters

Detroit, Mich.—To explore and promote the tentative policy established at the recent Board of Directors meeting in Detroit, S. F. Girard, Secretary of the National Standards Committee, will visit as many Chapters as possible between now and the Semi-Annual Meeting in Boston next October, W. H. Smila, Chairman of the Committee, has announced.

The purpose of this program is to aid Chapter Standards Committee Chairmen by indoctrination, through personal contact, in the workings of the national body; to codify the activities and thinking of the Standards Committee; and to round out the new and improved Data Sheet program.

Already Mr. Girard has visited Standards Chairmen at Milwaukee, Racine, Fond du Lac, Rockford, Chicago and Toledo Chapters.

Modern Lubricating System Can Be Source of Economy

Montreal, Que.—The considerable savings in costs realized by the use of modern lubrication systems was emphasized by E. Ralph Harris of the Stewart-Warner Corp., in his talk, "Evolution in Lubrication," before the April meeting of Montreal Chapter.

Mr. Harris described the development of lubrication from the days when animal grease was smeared on moving parts with the end of a piece of wood to the present time when as many as a hundred bearings are lubricated by a single push button control.

Several types of lubricating systems were demonstrated, including a fully automatic system controlled by a time clock. The control could be set to give a series of bearings a specified amount of lubrication at any desired time interval. Mr. Harris stressed the importance of proper location of lubricating points in machine design, especially as concerns accessibility.

Abrasive Cut-Off Machines Shown

The uses and capabilities of modern abrasive cut-off machines were clearly demonstrated in the film, "Speed in Cutting," which was shown after the dinner.

R. B. Douglas, Second Vice-President, briefly described the highlights of the Houston convention and urged greater Society activity.

* * *

The previous meeting was highlighted by the installation of officers, presentation of an interesting paper, "Current Trends in Hardness Testing," and an enlightening film, "Micromatic Honing."

Mr. Douglas conducted the installation ceremonies, inducting the following officers: Chairman, H. T. Welch; First Vice-Chairman, G. S. Clarke; Second Vice-Chairman, W. S. MacLaren; Secretary, M. G. Baker; and Treasurer, C. J. McDowell.

Committee heads appointed by Chairman Welch for the current season are: Membership, M. A. Cote; Editorial, A. M. Rice; Constitution and By-Laws, W. F. Stewart; Standards, Herbert Brown; Public Relations, C. A. Gareau; Education, C. A. Cobb; Entertainment, A. B. Chevrier; and Program, G. A. Rogers.

The paper on hardness testing, and the slides which accompanied it, were followed with keen interest. The speaker, Vincent E. Lysaght, Sales Manager, Wilson Mechanical Instrument Co., Inc., New York City, brought out some little-known features of the latest developments in this field.

Testing Equipment Discussed

A large variety of testing equipment was described and the particular advantages of each clearly explained. Of especial interest were the designs of fixtures for holding odd-shaped parts and gooseneck arms for testing inside surfaces on cylindrical pieces.

Mr. Lysaght emphasized some of the most common causes of error in hardness testing, including the dangers of false values derived from readings on tests of cylindrical surfaces, due to the effect of the curvature on size of indentation.

The speaker warned against the possibilities of serious discrepancies in testing thin sections and the all-too-common mistake of taking for granted the accuracy of conversion tables of hardness numbers.

Micromatic honing was shown to have become a mass production process, according to the applications depicted in a film presented after the lecture.

Holds Brazilian Post

Sao Paulo, Brazil—Eugene J. Lahr, for 12 years a member of the engineering staff of E. H. Jones Machine Tools, London, England, is associated with Panambra, S.A., as Chief Engineer.

During the last few years of his English residence, Mr. Lahr was in charge of the instrument and measuring equipment section of the Jones organization. In the fall he expects to visit the United States and will assist American manufacturers interested in export to Brazil and the Argentine. He is a member of ASTE and MIECE.

Syracuse Chapter chose these officers for the 1947-48 term. From left: Carl Hoffman, Treasurer; Lester Collins, 1st V.-Chairman; Hugo Klix, Chairman; Fay Adkinson, 2nd V.-Chairman; John Sauda, Secretary

High Temperature Metals Panel Discussion Topic

Rockford, Ill.—A panel discussion of Refractory Metals highlighted the April 3 dinner meeting of Rockford Chapter held at the Masonic Cathedral.

A color film, presented by Fansteel Metallurgical Corp., showed the refining and processing of high temperature metals such as tungsten, tantalum and columbium from the ore stage to the final usage in commercial fields.

Following the showing of the film, A. L. Percy, assisted by J. O. Lee, conducted the forum concerning refractory metals and problems encountered in their use.

Also participating in the panel were three Chapter members: Karl Kaiser of Ingersoll Milling Machine Co.; Edward Walker, Metal Cutting Tools, Inc.; and Leo Reuland, Barber Colman Co.

Debates Optional Methods

Problems discussed included the relative merits of brazing or clamping carbide blanks to tool shanks. Several members of the audience questioned the panel concerning the selection of carbides for use on various metals and at different speeds.

The informative program was enjoyed by the 155 members in attendance.

* * *

Another outstanding Chapter event was the recent all-day field trip to Inland Steel Co., Indiana Harbor, Ind.

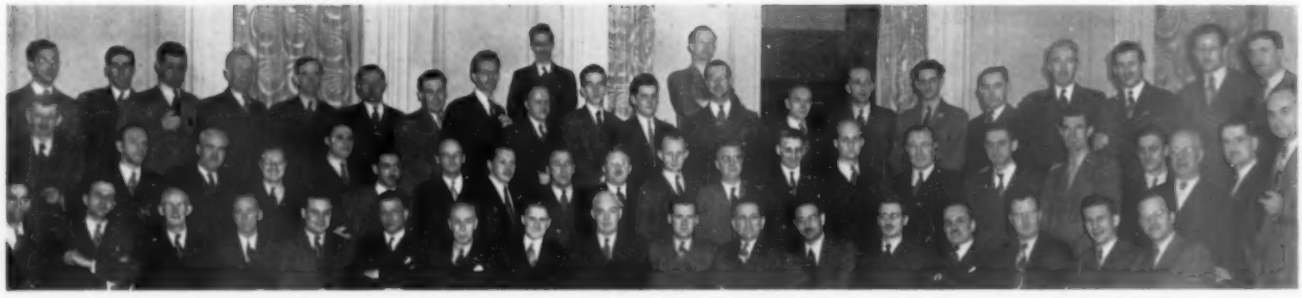
Forty-eight members in two chartered buses left Rockford at 9:00 a. m., had lunch at Smidts' Fish House in Indiana Harbor and reached their destination at 2:00 p. m.

The tour started with a visit to the blast furnaces which were just being tapped as the party arrived, giving them an opportunity to see the actual operation of these iron producing units.

From there the group progressed to the open hearth furnaces and observed the mechanical charging with scrap steel and iron. As one of the furnaces was tapped, the engineers watched the molten steel flow into the enormous ladles from which overhead cranes pour the liquid metal into large concrete molds.

At the hot roll mills, cold ingots were placed in large soaking pits prior to the actual rolling process. After the ingots were brought to the proper heat, the visitors saw them removed from the pits and sent down the rolling line for such operations as scarfing, descaling, cutting-off, and finish rolling. At the end of this continuous rolling process, the strip of steel was automatically wound into large rolls and dropped onto a conveyor.

After the tour, the ASTE guests left for Addison, Ill., where they had dinner at Louis' Restaurant, arriving back in Rockford in the late evening.



Part of group attending Installation Night at Montreal Chapter. Officers inducted are, first row, beginning fifth from left: C. J. McDowell, Treas.; (2nd V.-Pres. R. B. Douglas, installing officer), H. T. Welch, Chm.; G. S. Clarke, 1st V.-Chm.; W. S. MacLaren, 2nd V.-Chm.; and M. G. Baker, Secy.

Ford Executive Addresses Tenth Anniversary Night

Toledo, Ohio—The tenth anniversary of Toledo Chapter's founding was observed at a recent dinner meeting in the Secor Hotel.

Richard M. Hindman, retiring Chairman, reviewed the history of the Chapter's existence from its charter membership of about 25 to its present roster of over 300.

Nevin L. Bean, production engineering executive, Ford Motor Co., gave the principal address of the evening, using as his subject, "The Contribution of the Ford Motor Co. to Tool Engineering." Tracing the origin and development of the Ford apprentice and trade school system over the past quarter century, Mr. Bean gave a brief summary of posts held by its graduates from 1936-46. He mentioned many Ford executives in key posts who were trained in the company's schools. In the speaker's opinion, the Ford company's greatest contribution to tool engineering is its educational system and the men it has trained for industry.

New Officers Installed

The 1947-48 officers, installed during the evening by Director A. M. Schmit, are: Chairman, Albert Hage, Hage Industrial Corp.; First Vice-Chairman, Lawrence F. Rothert, Kent-Owens Machine Co.; Second Vice-Chairman, Val G. Kessler, Spicer Mfg. Co., Div. of Dana Corp.; Secretary, John E. Preas, Latrobe Electric Steel Co.; Treasurer, Raymond Peterson, Peterson Engineering Co.; Delegate, Arthur B. Bok, Kent-Owens Machine Co.; and Alternate, Richard M. Hindman, Doehler-Jarvis Corp.

Guests introduced by Toastmaster Harvey G. Straub, Judge of the Court of Common Pleas, were: Willard I. Webb, Jr., President of Ohio Citizens Trust Co.; W. B. Crew, General Manager of American Floor Surfacing Co.; Robert H. Kitzman, Plant Manager, Doehler-Jarvis Corp., Toledo Div.; Gerald H. McGreevy, Vice-President in Charge of Sales, Textileather Corp.; and Byron Fay, Vice-President, Electric Auto-Lite Co.

Raves Now Superintendent

Oakland, Calif.—Edward J. Raves has been promoted to the position of Superintendent at Grove Regulator Co., Emeryville, it was recently announced.

For the past six years, Mr. Raves has been Chief Inspector at Grove. Previously he was with Merco Nordstrom Co., in charge of the gauge laboratory and hard-facing of multi-port high temperature valves.

A Past Chairman of Golden Gate Chapter, Mr. Raves is now Delegate.

Film Shows Closeups Of Sawing, Cutting

Grand Rapids, Mich.—Technical program for the April 14 meeting of Western Michigan Chapter was presented by William Birney of the Grand Rapids branch, The DoAll Co.

A color film was shown depicting the sawing and cutting of various materials from paper to hardened steel. Samples of work were exhibited, along with products made for tool room and shop use. A general discussion period followed the film showing.

Earlier in the meeting, Charles Wilcox of the Michigan Consolidated Gas Co., spoke on present problems in supplying high Btu gas in the Michigan area. Proposed plans for the construction of an additional 26" pipeline from the natural gas fields of Texas were discussed.

Mr. Wilcox' description of the engineering involved in the project was illustrated with a large map of the route to be traversed. Completion of the new pipeline is expected in 1950.

Fifty-two members and guests attended the meeting and preceding songfest and buffet dinner.

Safety Important In Tooling Plans

Fort Wayne, Ind.—If tool engineers would incorporate safety more often in their plans and procedures, much of the safety engineer's work would be accomplished automatically, Herschel Smith, General Electric Safety Engineer, told approximately 75 Fort Wayne Chapter members at their April 9 dinner meeting in the Chamber of Commerce Bldg.

Mr. Smith emphasized his talk with a technicolor film, "The Voice of Safety."

A. J. Scheid, Vice-President in Charge of Metallurgy, Columbia Steel Co., spoke on "Principal Types of Tool Steel and Their Adaptability to Present Needs." A technicolor film was shown in connection with Mr. Scheid's talk.

Before the technical session, Milton Kline, Chapter Delegate, reported on the Houston convention.

Production Presswork Described by Zorn

San Francisco, Calif.—Featured speaker at the April 15 dinner meeting of Golden Gate Chapter was Herman F. Zorn, President and General Manager of V & O Press, Inc., Hudson, N. Y.

Mr. Zorn presented his subject, "Presses Geared for Automatic Production," to about 80 tool engineers gathered at the El Curtola Cafe, Oakland.

Using slides and films, the speaker showed many applications of production presses with intricate features. Long ways, he claimed, give 50-100% longer tool life.

In tracing his company's background, Mr. Zorn related how a stamping shop founded at Brooklyn in 1889 by "V" (Vinard) and "O" (Oswald) had grown to the present press building business.

Samples of work produced on such presses were exhibited, including smart lipstick containers, slide fasteners with a lively zip, and flawless mica discs.

E. J. Raves, Chapter Delegate, reported on the Houston convention and the election of Member Karl Bues to the Board of Directors.

* * *

George K. Dreher of the Pattern and Foundry Co., Los Angeles, presented the technical feature at the previous meeting, lecturing on the "Use of Non-Ferrous Castings."

Properties of non-ferrous metals and alloys enumerated by the speaker are: corrosion and fatigue resistance, electrical conductivity; ability to deform, low thermal expansion, bearing, non-magnetic, and sonic qualities essential in bell casting.

Mr. Dreher further stated that bronze has no true yield point such as that found in steel, making it better able to absorb shock on parts subject to impact.

Discussing characteristics of beryllium copper, he pointed out that this alloy can be hardened sufficiently for tools where the presence of combustibles makes the use of steel tools hazardous.

The film, "Golden Horizons," relating the saga of copper, was shown before the technical talk. Earlier in the meeting, Karl Bues installed the new officers.

Toledo Chapter marked its Tenth Anniversary with an installation dinner. Top: Director A. M. Schmit, back to camera, swears in the new officers. From left: Albert Hage, Chm.; Lawrence F. Rothert, 1st V.-Chm.; Val G. Kessler, 2nd V.-Chm.; John E. Preas, Secy.; and Raymond Peterson, Treas.

Clay Reports Progress In Guided Missiles

Newark, N. J.—Northern New Jersey Chapter marked its Annual Executive Night with a recent dinner meeting at Hotel Robert Treat, featuring Lt. Col. William L. Clay of the Ordnance Dept., U. S. Army, as guest speaker.

In an informative and timely discussion of Guided Missiles, Col. Clay traced the history of these weapons and their principal components, as well as jet propulsion devices under consideration for propelling the projectiles.

The speaker emphasized methods of guidance and control and associated problems and outlined objectives and developments in the Army Ordnance Guided Missile Program.

Col. Clay's talk was followed by a recent motion picture showing army experiments with the V-2 rocket at the Ordnance Proving Ground in New Mexico and some captured German films of V-2 launchings.

The attendance of approximately 150 included 40 guests representing prominent New Jersey industries in the Chapter area.

* * *

"Hardening Steel by Radio Frequency" was presented April 8 by R. Baker of Westinghouse Electric Corp., Baltimore.

Mr. Baker lectured comprehensively on this subject, showing slides illustrating examples of excellent contour hardening.

During the meeting John Webster, Chapter Delegate, reported on the Houston convention.

Ainsworth Discusses A.S.A. Activities

Seattle, Wash.—Cyril Ainsworth, Technical Director and Secretary of the American Standards Association, was guest speaker at a dinner meeting of Seattle Chapter held April 15 in the Gowman Hotel.

Mr. Ainsworth discussed national aspects of standardization activities, stressing the importance of the tool engineer in this program. At the conclusion of his talk, the speaker invited questions from the floor, the members responding with enthusiasm.

Concluding the program were three films, "The Man-Au-Trol," "Jet-Assisted Takeoff for Heavy Bombers," and "Football Highlights of '46."

Kansas City members and guests enjoy inaugural dinner dance at Hotel President. Past and present officers and guests at speakers' table are, from left: Mrs. Mason, W. W. Mason, Past Chairman; Mrs. Brown, H. R. Brown, Past Chairman; Mrs. Gallagher, J. W. Gallagher, Past Treasurer; Mrs. Brunson, A. N. Brunson, Past Chairman; A. M. Sargent, retiring President; LeRoy Campbell, Chairman; Miss Dorothy Rickman, G. V. Potter, Second Vice-Chairman; Mrs. Potter, Howard Lebo, Secretary; Mrs. Lebo, C. F. Rapp, Treasurer; and Miss Maxine Minter. Officers were installed by Mr. Sargent

French Industry Suffers In Postwar Confusion

Elmira, N. Y.—First-hand observations of the postwar political and economic chaos rampant in France were reported by Rene E. Demure, Master Mechanic, Eclipse Machine Div., Bendix Aviation Corp., before an audience of Elmira Chapter members at a dinner meeting held April 7 in the Mark Twain Hotel.

A resident of the U. S. since 1925, Mr. Demure recently visited his homeland, studying the inflationary trend there.

The scarcity and high cost of food and clothing are beyond imagination, he said. Quoting numerous incidents of conditions encountered in bus and train travel, he gave a vivid picture of the unhappy state of the French people.

Vague fears of an impending crisis, he added, have caused the uneasy population to cache private stores of arms and ammunition.

In Paris, the speaker spent some time renewing old acquaintances and visiting industrial plants. His account of working conditions, wages and production methods indicated that the industrial standards are far below those prevailing in this country.

Following Mr. Demure's interesting talk, the 75 members and guests were shown the General Electric color film, "Resistance Welding." With proper tooling and good electronic control, the film demonstrated, a resistance welder can handle a great variety of work, from spot welding filaments in electronic tubes to flash welding one-inch bars.

Robert Greer of the General Electric Welding Engineering Sales Corp., who presented the motion picture, answered questions and showed samples of resistance welding.

Challenges South to Hold Industrial Ground Gained

Atlanta, Ga. — William H. Wilkerson of the Auto Soler Co. addressed a meeting of Atlanta Chapter held April 21 in the Georgia Tech Dining Hall.

Mr. Wilkerson in his talk, "Dixie—Look to Your Boot Straps," outlined the history of his company and flung a challenge to southern industry.

Installation of officers featured the previous meeting. James C. Cogburn, Jr., retiring Chairman, administered the oath of office to: Dwight L. Hollowell, Chairman; George Brown, First Vice-Chairman; Charles F. Bolden, Jr., Second Vice-Chairman; Linton I. Harris, Secretary; and Charles Blaylock, Treasurer.

Mr. Hollowell in his speech of acceptance appointed committee chairmen and outlined plans for the coming year.

For the technical feature W. A. Dobbs of the Shell Oil Co. introduced Earle Bastian, also of Shell, who presented a series of slides illustrating a talk on his company's industry indoctrination program, a basic plan for education in the use of machine tools and Shell's part in furnishing coolants and lubricants.

Officers Installed At Dinner Dance

Kansas City, Mo.—Kansas City Chapter observed Inauguration Night with a dinner dance held recently in the roof garden of the Hotel President and attended by approximately 225 members and guests.

After the dinner A. N. Brunson, owner of Brunson Instrument Co. and immediate Past Chairman of the Chapter, presented A. M. Sargent, retiring ASTE President, who discussed the importance of the tool engineer in modern industry and installed the Chapter's new officers.

Those taking the oath of office were: L. E. Campbell, Chairman; G. V. Potter, Second Vice-Chairman; W. H. Lebo, Secretary; and C. F. Rapp, Treasurer. F. M. Epperson, First Vice-Chairman was unable to attend the ceremony.

Approximately 100 attendance prizes were awarded. Entertainment and dancing concluded the program.

High Production Claimed For Air-Operated Tools

Toronto, Ont.—"If, in production, you have repetitive operations, then air can speed these operations," said Howard E. Mills, Sales Manager, The Bellows Senacon Co., Akron, Ohio, addressing 207 Toronto Chapter members April 14 on "The Use of Air on Machine Tools."

Thoroughly familiar with his subject, the speaker showed and described in detail a variety of air equipment for production operations.

Drilling, reaming, tapping and threading operations, performed with a controlled cycle and little effort on the part of the operator, highlighted the lecture. Operator fatigue having been eliminated, Mr. Mills pointed out, the equipment serves also to promote better employee-employer relations.

Two motion pictures were shown, the first describing air-operated equipment and attachments to speed production, and the second illustrating the machinery in action.

* * *

On April 11, 368 members and their guests gathered in the Concert Hall of the Royal York Hotel for the Chapter's Annual Dance.

During the speaking program which followed the dinner, Past Chairman Walter Appleton proposed a toast to the ladies to which Mrs. Thomas Burk, wife of the Chapter Secretary, responded in a serene and charming manner.

Cushing with Equitable

Walden, N. Y.—Thomas E. Cushing, formerly of the Sales Engineering Dept., Machine Div., SKF Industries, Philadelphia, Penna., has been appointed Chief Engineer of Equitable Bearing Co., Inc., Frank E. Beane, President, has announced.

For over 21 years Mr. Cushing has been associated with the ball and roller bearing industry, serving throughout this period in various sales engineering activities for SKF.

During the past five years, he has supervised the engineering section handling the application of bearings to spindles and machine tools. He is a member of Philadelphia Chapter, ASTE; ASM, and ASME.

New England industrialists, scientists and Society officers are honor guests at Boston Chapter's Executives Night dinner. Group at speakers' table, from left: C. C. Gorham, Chapter Education Chairman; W. H. Reger and A. M. Halverson, General Electric Co.; H. W. Porter, H. K. Porter, Inc.; Dr. V. O. Homerberg, Massachusetts Institute of Technology; K. D. Doble, Pneumatic Scale Corp., Ltd.; J. P. Crosby, Second Vice-Chairman; Prof. Albert Haertlein, Engineering Societies of New England; J. X. Ryneska, Chairman; L. K. Marshall, Raytheon Mfg. Co.; J. B. Savits, retiring Chairman; I. F. Holland, ASTE First Vice-President; Hon. Jarvis Hunt, Asso. Industries of Massachusetts; W. W. Young, First Vice-Chairman; W. L. Gifford, Submarine Signal Co.; W. H. Nichols, W. H. Nichols Co.; W. E. Mutz, Chelsea Clock Co.; A. J. Leone, Treasurer; and R. H. Morris, Past President

Electrical Discoveries Pave Way for Industrial Advances

Boston, Mass.—Present industrial achievements and future possibilities resulting from electrical research were brought home to more than 300 members and guests of Boston Chapter attending the recent combined Executives and Ladies Night program presented during a dinner meeting at Hotel Somerset.

As featured speaker, Lawrence K. Marshall, President of Raytheon Mfg. Co., discussed "A Tool Engineer Looks at Electronics." Naming wartime accomplishments of the industry, he stated that electronics can see, feel, hear and taste and will soon be able to smell.

Present equipment, he said, can now measure speed up to 1/10,000 of a millionth of a second. The speaker also described a new electronic range which cooks meat in seconds.

Through amazing scientific legerdemain, W. H. Reger of the Schenectady Research Laboratory, presented the General Electric "House of Magic." The fascinating demonstrations included use of an electric eye attached to a loud speaker to "hear" light, manually squeezing light from a gas filled tube and projecting music across a room on a beam of light.

Holding an ordinary electric light bulb in his hands, Mr. Reger showed that it could be lighted from the electric current flowing through his arms.

In one of the many other demonstrations, he made a small electric locomotive obey his oral commands to "go ahead," "stop," and "back up."

Other speakers included Hon. Jarvis Hunt, legal counsel for the Associated Industries of Massachusetts; I. F. Holland, ASTE First Vice-President, who installed the new Chapter officers; J. B. Savits and J. X. Ryneska, retiring and incoming Boston Chapter Chairmen, respectively.

Chairman Ryneska received the Chapter Chairman pin from his predecessor, Mr. Savits, who in turn was presented with a Past Chairman pin by Mr. Holland.

Distinguished personages at the speakers' table included: Victor O. Homerberg, Sc.D., Massachusetts Institute of Technology; Kendall D. Doble, President, Pneumatic Scale Corp., Ltd.; H. W. Porter, President, H. K. Porter, Inc.; Prof. Albert Haertlein, President, Engineering Societies of New England; A. M. Halverson, Assistant to Manager, General Electric Co., Lynn River Works.

Joseph P. Crosby, Vice-President, Lapointe Machine Tool Co.; Wallace L. Gifford, Vice-President, Submarine Signal Co.; Ray H. Morris, Past President, ASTE; W. H. Nichols, Sr., President, W. H. Nichols Co.; William W. Young, Pratt & Whitney Div., Niles-Bement-Pond Co.; Walter E. Mutz, Treasurer, and A. J. Leone, Assistant Superintendent, Chelsea Clock Co.

Situation Wanted

AS FOREIGN REPRESENTATIVE of U S. manufacturer by Navy veteran, 31. Former Jr. Tool Designer with aircraft plant, has excellent knowledge of administrative office work and good working knowledge of machine tools. Available to travel world-wide, prefers assignment in Great Britain. Opportunity for advancement main consideration. Can furnish excellent personal character recommendations. Address replies to Box 116, American Society of Tool Engineers, 1666 Penobscot Bldg., Detroit 26, Mich.

Good Steel Small Factor In Over-all Tooling Cost

St. Catharines, Ont.—"Tool Steel Simplified" was discussed by George J. Schad, Tool Steel Metallurgist of the Carpenter Steel Co., Reading, Penna., before 80 members and guests at a meeting of Niagara District Chapter, April 17, in the Welland House.

Mr. Schad outlined the history of tool steel since the origin of the Bessemer process a century ago. He emphasized important advances such as high speed and stainless steels, developed in the 1910-20 period, up to the present day variety of steels used to meet the exacting requirements of industry.

The speaker gave a brief analysis of advantages and disadvantages of the most commonly used grades of tool steels and followed his talk with an interesting question and answer period.

Frank R. Palmer, Vice-President in Charge of Sales at Carpenter Steel, spoke on the value of competition in the steel industry. "This competition is not a matter of price," he said, since all companies have the same general price, "but is rather a matter of quality of product and service to the consumer." He pointed out that the "price of the steel used to make a tool is usually a small fraction of the total cost and therefore quality is more vital."

* * *

Describing ASTE as "the most significant engineering movement of this generation," R. B. Douglas, Society Vice-President, conducted the installation of officers at an earlier Chapter meeting.

Officers sworn in for 1947-48 are: W. L. Sandham, Chairman; N. B. Coleman, First Vice-Chairman; R. R. Wood, Second Vice-Chairman; E. L. Morley, Secretary; and H. A. Wood, Treasurer. Chairman Sandham, in accepting his office, announced plans for an extensive membership drive.

Following the showing of entertaining sound films, the audience of 60 members and friends was addressed by W. A. Thomas, Chief Tool Engineer, Ford Motor Co., Canada. Mr. Thomas, who is Chairman of the ASTE Canadian Standards Committee, gave a short report on the recent numerical indexing of the Society's data sheets.

Are You an ASTE'er Circa 1937 or Earlier?

Then you can aid the Society in its educational program by contributing 1932 issues of *The A.S.T.E. Journal* and any copies of *The Tool Engineer* prior to 1938. These are needed by libraries throughout the country to complete their files of our publication.

Please send magazines to H. E. Conrad, Executive Secretary, American Society of Tool Engineers, 1666 Penobscot Bldg., Detroit 26, Mich.

Top: I. F. Holland, 1st V.-Pres., administers the oath of office to Boston's new Chapter executives. From left: A. J. Leone, Treas.; J. P. Crosby, 2nd V.-Chm.; W. W. Young, 1st V.-Chm.; and J. X. Ryneska, Chm. Middle: New Haven Chapter's Executive Committee holds its first meeting in the New Haven Country Club. From left, standing: Harold Rayner, M. J. Radecki, Constitution and By-Laws Chm.; F. J. Dawless and Frank Shute, Past Chm.; David Mathewson, T. T. O'Connor, Treas.; Wilbur Sullivan. Seated: John Kulawiz, R. M. Strickland, Editorial Chm.; C. A. Chipman, Public Relations Chm.; R. E. Gifford, Chm.; A. V. Pollard, 1st V.-Chm.; J. A. Benson, Membership Chm; F. W. Braynard, 2nd V.-Chm.; and G. P. Schoeller, Secy. Bottom: Chm. C. V. Lofdahl (left, standing) of Twin City Chapter is congratulated by installing officer E. W. Dickett of the National Membership Com. Seated, from left: R. I. Martin, 2nd V.-Chm.; L. C. Blanchar, Secy.; P. S. Tobias, Treas.; H. D. Sullivan, 1st V.-Chm.; and W. E. Boker, Chapter Delegate

Explodes Fallacies Concerning Rake Angles

Minneapolis, Minn. — At the April meeting of Twin City Chapter, a near-record audience gathered in the Covered Wagon Cafe to hear D. V. Stevens, Vice-President of Kearney & Trecker Corp., Milwaukee, Wis., discuss "Practical Application of Cutting Tools."

Mr. Stevens described the use of carbide cutters, pointing out some mistaken conceptions concerning rake angles. It was made clear that a tool having a negative rake angle is stronger than one with a positive rake angle, the main reason for its use in machining steel. However, the horsepower required is greater for the machining operation.

The speaker then commented on the advantages of a double rake angle in which a primary negative rake angle and a secondary positive rake angle are used. This results in better chip clearance, with less horsepower required for the machining, he added.

New Officers Assume Duties

Preceding Mr. Stevens' talk, a general business meeting took place, the first to be conducted by the new officers. Chairman for the 1947-48 season is Clifford V. Lofdahl, Tool Designer, Minneapolis-Honeywell Regulator Co.

Other officers include: First Vice-Chairman, Harold D. Sullivan, Asst. Supervisor, Tool Design, and Treasurer, Peter S. Tobias, Supervisor, Tool Design, at Minneapolis-Honeywell; Second Vice-Chairman, Raymond L. Martin, Partner, Martin & Prestegaard Co.; and Secretary, Loren C. Blanchar, Dept. Head, Wm. H. Dunwoody Industrial Institute.

Committee chairmen, announced and introduced at the meeting, are: Editorial, Roy W. Hawkinson, Partner, Gopher Machine & Engineering Works; Constitution and By-Laws, Charles G. Adams, Managing Partner, Twin City Die Casting Co.; Membership, Glen Roberts, Process Engineer, Gray Co., Inc.

Industrial Relations, Emmett J. Lyons, Owner, Lyons & Carlson Co.; Standards, Percy Aiken, Chief Tool Designer, and Education, Darrell A. Coacher, Methods Engineer, General Mills, Inc.; Program, Harold D. Sullivan; Public Relations, Alex J. Bielski, Design Engineer, Minneapolis-Honeywell; and Entertainment, Walter F. Sahlin, Asst. Director, Wm. H. Dunwoody Industrial Institute.

William Boker, Chapter Delegate to the Houston convention, gave an interesting and detailed report on the National Meeting, enlightening the membership concerning the Society program for the coming year.

Penny Delivers Lecture On Electronic Controls

New Haven, Conn.—"Electronic Control of Machine Tools," as explained by F. H. Penny, Electronic Applications Engineer, General Electric Co., was followed with intense interest by New Haven Chapter members for more than an hour at their April 10 meeting in the Connecticut Light and Power Auditorium, as Mr. Penny described various types of controls used on special machines.

Slides were used by the speaker to illustrate the machines and controls referred to in the lecture. At the end of his discussion, Mr. Penny competently answered all questions from the floor and elaborated on points already mentioned.

Biochemists Discover Success Mechanism

St. Louis, Mo.—By means of chemical mechanisms, the mind can influence the body to better health, more happiness and business success, Dr. Hilton Ira Jones, eminent scientist and lecturer, declared in an address before more than 400 members and guests of St. Louis Chapter attending the group's recent Annual Executives Night in the DeSoto Hotel.

Dr. Jones, who is Director of Research for Hizone Laboratories, Wilmette, Ill., explained in his lecture, "A Study in Self-Management," the "Two Triumphal Hours," and their tremendous potential force and other startling discoveries in the field of biochemistry.

Must Tool for Less Skilled

A. M. Sargent, retiring ASTE President, spoke on the "Importance of Tool Engineering in Postwar Planning," reminding the group of the task industry has in tooling up production units for the semi-skilled operators who must help fill the ranks of skilled workers.

Clarence L. Miller, a Past Chairman, conducted the installation of 1947 Chapter officers, administering the oath of office to: E. H. Ruder, Chairman; H. M. Creasey, First Vice-Chairman; W. G. Callies, Second Vice-Chairman; E. P. Huchzermeier, Secretary; R. C. Kallemeier, Treasurer; J. J. Demuth, Delegate; and O. W. Johaning, Alternate.

Ernst Nieman, another Past Chairman, presented J. J. Demuth, the retiring Chairman, with a Past Chairman pin. Mr. Ruder, the newly-installed Chairman, received from his predecessor the Chapter Chairman pin and from E. H. Doogan, first Chairman of the St. Louis group, the Chapter charter.

Willis Ehrhardt, a former Chairman, opened the program with an address of welcome.

Modern Abrasives Used As Production Tool

Baltimore, Md.—Thomas Trowbridge, Assistant Manager, Engineering Department, Behr-Manning Corp., gave Baltimore Chapter members an excellent presentation of "The Modern Use of Abrasives" during their April dinner meeting in the Engineers Club.

Mr. Trowbridge developed his subject from a historical viewpoint before describing present applications in conjunction with modern machining methods, true production tools and all other edge tools for metal removal.

The speaker used extensive illustrations and demonstrated working models at the conclusion of his talk.

Prior to the technical session, Judge Stephen V. Campbell, Jr., talked humorously on the "love life of an oyster."

Thomas Burke, newly-elected Chairman, introduced his fellow officers to the 75 members and guests present. Those presented were: George Exley, First Vice-Chairman; George Stevens, Second Vice-Chairman; Andrew J. Jones, Secretary; and Thomas McCauley, Treasurer.

Mr. Burke then announced the following appointments to committee chairmanships: Membership, W. D. Winger; Public Relations, Merrill S. Matson; Editorial, H. B. Mecaslin; Standards, C. I. Hochhaus; Program, G. A. Exley; Education, James Francey; Constitution and By-Laws, H. G. Suter; and Entertainment, Godfrey Steiner.

Top: Buffalo-Niagara Frontier officers were installed by retiring President A. M. Sargent. From left: E. A. Slate, Secretary; P. C. Richardson, Treasurer; Mr. Sargent, Albert Kirchgessner, Chairman; G. C. Kingston, Second Vice-Chairman; and C. F. Maute, First Vice-Chairman. Bottom: Chosen to direct Baltimore Chapter's activities are, from left, seated: G. J. Stevens, Second Vice-Chairman; T. F. Burke, Chairman; G. A. Exley, First Vice-Chairman. Standing: T. B. MacCauley, Treasurer; and Andrew J. Jones, Secretary

Samples Show Versatility Of Multi-Slide Presses

Poughkeepsie, N. Y.—Technical speaker at the April 8 dinner meeting of Mid-Hudson Chapter was W. P. Powers, Secretary of U. S. Tool Co., Inc., East Orange, N. J.

Mr. Powers' talk, "Multi-Slide Presses," was illustrated with several films showing the principles and applications of high production machines.

During the question period, Mr. Powers was assisted by A. Melnick, Chief Engineer, and A. E. Bumpus, District Field Engineer of U. S. Tool.

Approximately 100 samples of skeleton strip and finished parts produced on the multi-slide machine were exhibited. Production on these machines, it was explained, runs from 85 to 600 pieces per minute, depending on size of part and thickness of material.

Samples shown ranged from simple bearing bushings to complicated strip assemblies such as adjustable bracelet mountings, cable clamps and electrical appliance fittings.

Previous to the technical session, Louis Shaw, Director and Vice-President in Charge of Advertising, Smith Bros., Inc., gave a humorous talk on "Facts and Fiction About the Cough Drop Business."

Mr. Shaw, in common with other Smith Bros. executives, wears a beard in honor of the company's 100th anniversary.

First Vice-Chairman L. H. Tenney gave a summary of a report from Eugene Roth, Greater New York Chapter Delegate who represented Mid-Hudson Chapter at the Houston convention.

The program was in charge of Joseph L. Petz, dinner arrangements were handled by Don Winslow, and music was furnished by Floyd Billings. Approximately 100 members attended the meeting.

Executives Take Office Committee Heads Named

San Diego, Calif.—Installation of officers was held recently by San Diego Chapter at a meeting in the Consolidated Vultee Aviation Corp. Cafeteria No. 1.

Chairman for the 1947-48 season is Ray W. Peters. Others taking the oath of office were: Burt F. Raynes, First Vice-Chairman; V. A. Petricola, Second Vice-Chairman; W. I. Whiteside, Secretary; and Clarence R. LaCourse, Treasurer.

Following the installation, the new officers expressed their views for the coming year. Chairman Peters introduced his committee chairmen: Program, R. Adams; Membership, K. A. Seely; Education, A. C. Arends; Standards, M. A. Gould; Constitution and By-Laws, H. F. Bartling; Public Relations, E. G. Gray; Editorial, A. P. Manino; and Advisory, P. H. Whitmoyer.

R. J. DeRoche, District Engineer, The Carborundum Co., Los Angeles, spoke on "Crush Grinding" and exhibited samples of work done by that process.

The showing of an Army Air Force film, "Flying the B-36," completed the program.

Grindrod, Plant Manager

Chicago, Ill. — Cyril Grindrod has joined Dole Valve Co. as Plant Manager, according to a recent announcement.

For the past several years, Mr. Grindrod has been associated with Bowser, Inc., Fort Wayne, Ind., as Assistant to Vice-President in Charge of Production, and with Joseph Weidenhoff, Inc., a wholly-owned subsidiary of Bowser, as Plant Manager.

Previously he was connected with the Wyckoff Drawn Steel Co. and Union Drawn Steel Div. of Republic Steel Corp. He was the first Chairman of Fort Wayne Chapter, ASTE.

Tells Factors Governing Cutting Fluid Selection

Flint, Mich.—Benefits resulting from the use of cutting oils, factors in their selection, and properties which should be inherent to all cutting oils were described in detail by James McElgin, Manager, Metal Working Dept., E. F. Houghton & Co., Philadelphia, in a paper, "New Developments in Cutting Oils and Drawing Compounds," read before Flint Chapter members at a recent dinner meeting in Zehnder's Hotel, Frankenmuth.

Addressing the 83 members and guests present, Mr. McElgin thoroughly explained the use of cutting oils and drawing compounds in relation to various tools, machines, speeds and operations.

The technical talk was followed by a film, "Sapphire—An Engineering Material," featuring the manufacture of synthetic sapphires, including the fabrication of diamond impregnated tools used for cutting the original stone down to the finished jewel.

Leon A. Pratt, former Chairman of the Constitution and By-Laws Committee, installed the new Chapter officers. Technical chairman for the meeting was J. A. Koeppen.

Metallurgist Discusses Alloys for Die Casting

Toledo, Ohio—A lecture on Die Castings by J. C. Fox, Vice-President and Chief Metallurgist, Doehler-Jarvis Corp., was the featured attraction at the April 9 dinner meeting of Toledo Chapter held in the Toledo Yacht Club.

Alloys used in die casting were discussed by the speaker, who cited numerous examples best suited for each alloy. Mr. Fox described also the development of dies and die casting machines from small hand-operated models to the large hydraulic ones in use today.

Elaborate metallurgical charts, diagrams of dies and machines, and a motion picture covering the entire field of die casting were shown, as well as a large display of samples. Many questions were asked from the floor in the ensuing open forum.

The meeting was attended by approximately 140 members and guests.

Human Analysis Essential To Effective Job Training

Richmond, Ind. — Members of Richmond Chapter learned about "Fitting the Man for the Job" when O. M. Aders, Director of Industrial Education at The Perfect Circle Co., Hagerstown, addressed them at a recent meeting in the Leland Hotel.

Mr. Aders, who has spent several years in human analysis work, stressed the value of putting the right man in the right place.

Jesse W. Johnson, retiring Chairman, installed the new officers and transferred the Chapter Chairman pin to Lowell B. Penland, his successor.

Chairman Penland anounced the appointment of the following committee chairmen: Paul Hermansdorfer, Membership; Robert A. Schafer, Industrial Relations; Howard Evans, Public Relations; Claude Crane, Editorial; Roland E. Lockridge, Constitution and By-Laws; Ralph McKee, Entertainment; Alfred F. Knose, Standards; Dezell Gibbs, Education; and Louis F. Wahl, Program Advertising.

From top: 1. Heading Flint Chapter for 1947-48 are, left to right: H. A. DeVore, Secy.; R. M. Ayers, Treas.; J. A. Koeppen, 2nd V.-Chm.; N. F. Snyder, Chm.; and H. T. Pierpont, 1st V.-Chm. 2. Milwaukee's incoming officers examine the Chapter's giant gavel. From left: J. J. Ebner, 1st V.-Chm.; N. V. Husting, 2nd V.-Chm.; H. G. Heimann, Secy.; Paul Butzer, Chm.; R. H. Ford, retiring Chm.; and A. G. Gudert, Treas. 3. Richmond Chapter affairs this year will be conducted by, from left, 1st and 2nd rows: G. E. Hall, Treas.; Paul Hermansdorfer, Membership Chm.; H. E. McCain, Secy.; J. W. Johnson, retiring Chm.; L. B. Penland, Chm.; R. A. Schafer, Industrial Relations Chm.; J. E. Church, 1st V.-Chm.; Howard Evans, Public Relations Chm.; F. T. Sykes, 2nd V.-Chm. Rear row: R. R. McKee, Entertainment Chm.; L. F. Wahl, Program Advertising Chm.; C. M. Crane, Editorial Chm.; and R. E. Lockridge, Constitution and By-Laws Chm. 4. Akron officers get a hand from the membership following their installation. From left: H. A. Guy, Chm.; L. P. Bokanyi, 1st V.-Chm.; G. A. (Pop) Irwin, 2nd V.-Chm.; John F. Klein, Secy.; Richard H. Cochrane, Treas.

Intricate Die Castings Shown by Lecturer

Erie, Pa.—J. C. Fox, Chief Metallurgist of the Doehler-Jarvis Corp., was a recent speaker before Erie Chapter at a dinner meeting in the General Electric Company Community Center.

With the aid of slides, Mr. Fox gave a very enlightening presentation of "Elements of the Die Casting Process," discussing the properties of the six main die casting alloys. The film, "Introduction to Die Casting," graphically depicted various types of dies, die casting and alloys.

An open discussion and inspection of a display of intricate die cast pieces followed the lecture.

Prior to the technical session, retiring Chairman Harold W. Hagle installed the incoming officers. Those taking the oath of office were: Mathew Hetzel, Chairman; Vincent A. Peck, First Vice-Chairman; E. L. Kern, Second Vice-Chairman; Walter Cebelinski, Secretary; and Stanley Sadoski, Treasurer.

Hall Named Asst. Editor

New York City—Stuart P. Hall, formerly Asst. Productive Gear Engineer at Buick Motor Div., General Motors Corp., Flint, Mich., has accepted a position with McGraw-Hill Publishing Co. as an assistant editor of *Product Engineering*.

Mr. Hall has been with General Motors since 1939 when he joined the Research Laboratories staff. In 1940 he went to Buick as a student engineer, serving during the war years as a process engineer on tank drives and transmissions, until 1944 when he was made Assistant Productive Gear Engineer.

In 1940 he was graduated from Rensselaer Polytechnic Institute, Troy, N. Y., as a mechanical engineer. He is a member of Sigma Xi, Tau Beta Pi and Pi Tau Sigma engineering fraternities.

A former chairman of the Education Committee of Flint Chapter, ASTE, he is also author of a section in the forthcoming "Tool Engineers' Handbook," entitled "Tool Engineering Economics."

Industry Cooperation Needed in Engineering Training

Boston, Mass.—Until industry standardizes recurrent engineering problems to generally accepted methods, "it is a waste of time for the engineering schools to try to teach anything more than general principles of engineering," Earle Buckingham, Professor of Mechanical Engineering, Massachusetts Institute of Technology, declared in an address, "How Can Engineering Schools Best Develop Tool Engineers to Fill Industry's Requirements?" before 150 Boston Chapter members, guests, and prominent educators from New England colleges and universities.

Professor Buckingham's talk was the principal feature of a symposium on the professional aspects of tool engineering, arranged by the Chapter Education Committee under the direction of Charles C. Gorham, Chairman, and held April 10 at New England Mutual Hall.

Defines Tool Engineering

In outlining the field of tool engineering, Professor Buckingham defined the art as what takes place "between the acceptance of the experimental design and production in quantity, together with the continued engineering problems of making the product continually better and cheaper."

According to Professor Buckingham, the major specialties embraced in this field are: Production Design, Operation Layouts and Schedules, Tool Design, Initial Production of New Products, Quality Control, Cost Reduction, Correction and Improvement of Production Design, Process and Product Development, and Skill and Attitude of Workmen.

Improvement in product and reduction in cost, he believes, should always be coupled, but responsibility for quality control and for production must never be joined or quality will suffer.

As "engineering is an art based on science and applied with the judgment that develops with experience," a college, the speaker said, "can do no more than train a person to the point where he can complete his education himself."

Industry's Responsibilities

In conclusion he touched on industry's educational responsibilities, such as the training of apprentices, new operators, foremen and student engineers; as well as the responsibility of practising engineers in passing their "know-how" on to recruits.

By this process of "working himself out of a job," the intelligent engineer will eventually reach the top, he pointed out.

A lively panel discussion followed participated in by Dean William T. Alexander, College of Engineering, Northeastern University; Dean L. E. Seeley, Division of Engineering, University of New Hampshire; Dr. Maurice E. Bates, Acting Dean, Division of Engineering, Massachusetts State College; Prof. H. D. Watson, Department of Engineering, University of Maine.

Dr. T. Stephen Crawford, Acting Dean of Engineering, Rhode Island State College; Prof. Zenas R. Bliss, Division of Engineering, Brown University; Prof. E. A. Sherrard, Thayer School of Engineering, Dartmouth College; Prof. E. E. Leavitt, Mechanical Engineering Department, Tufts College; Arthur E. Keating, President, Bridgeport Engineering Institute; Prof. Prescott A. Smith, Mechanical Engineering Department, Massachusetts Institute of Technology; and Professor Buckingham.

The forum resolved itself into a frank and illuminating discussion of the type of training a technical school should offer and where to draw the line between broad cultural subjects and distinctly technical ones.

Other speakers preceding Professor Buckingham were Mr. Keating, I. F. Holland, First Vice-President of ASTE; and John X. Ryneska, Chapter Chairman.

Lectures on Properties Of Spring Materials

Hamilton, Ont. — Approximately 70 members and guests of Hamilton Chapter heard Lorne G. Elder, Chief Spring Engineer of Wallace Barnes Co., in an address on "Mechanical Springs" at their April 11 meeting in the Iroquois Hotel, Galt.

Dealing at length with the comparison of tensile strength of spring material, modulus, general spring tolerance and spring materials for elevated temperatures, Mr. Elder outlined the specifications required for compression springs and extension springs. The lecture was well illustrated with charts and curves.

A new technicolor film, produced by the City of Hamilton and depicting local scenes, was shown during the evening.

Charles Fisher, Past Chairman and Alternate, gave an account of the Annual Meeting at Houston.

Attendance included members and guests from the surrounding communities of Kitchener, Hespeler, Guelph and Brantford, as well as Galt and Hamilton.

* * *

On April 9, 30 Hamilton members journeyed by chartered bus to the Buffalo-Niagara Frontier Chapter meeting, their first visit to an ASTE Chapter in the U. S.

W. A. Dawson, National Secretary, addressed the international group, describing his trip to Texas and the ASTE convention there.

W. A. Alexander, Hamilton Chairman, presented Albert F. Kirchgessner, Chairman of the Buffalo group, with a handsomely engraved gavel commemorating the occasion.

Sound Waves May Power Machinery of Future

Indianapolis, Ind. — Executives Night featured the April 3 meeting of Indianapolis Chapter with Dr. Hilton Ira Jones, noted scientist and lecturer, as guest speaker. Dr. Jones' subject was "Study in Vibrations."

The possibility of developing machinery which could be operated by sound vibrations was suggested by the speaker.

In commenting on the development of nuclear physics, Dr. Jones observed that Russia has led the world in this field.

Talks on Twist Drills

Milwaukee, Wis.—April meeting of Milwaukee Chapter was held on the 10th at the Elks Club with E. T. Schneider, Chicago District Manager, Cleveland Twist Drill Co., as guest speaker.

After an introductory talk, Mr. Schneider showed a sound film, "Uses and Abuses of Twist Drills." Following the motion picture showing, the speaker answered numerous questions from the floor.

Two color films of bass and salmon fishing were shown through the courtesy of Evinrude Motors.

Obituaries—

Bernard W. McGuire

Bernard W. McGuire, 34, of the Camera Works Tool Div., Eastman Kodak Co., Rochester, N. Y., lost his life while fighting a recent fire at Brighton, N. Y.

A volunteer fireman, Mr. McGuire was affected by smoke during the fire, but apparently recovered when ammonia was administered.

After the fire, his automobile was found out of control across the sidewalk near the firehouse, with the stricken McGuire lifeless at the wheel. Another fireman was overcome by smoke in the blaze which destroyed a Brighton home.

Mr. McGuire had been associated with the Eastman company for more than 18 years and had been a member of Rochester Chapter, ASTE, for the past several years.

William G. Jenkin

William G. Jenkin, 58, President of Jenkin-Guerin, Inc., St. Louis, died recently in that city.

Mr. Jenkin was born in London, England, in 1888 and came to America in 1914. He received his academic education in England, but he always felt that he could learn a little more from his associates. He spent his entire career working with oils, acquiring the nickname of "Oily." His British accent and culture made him an exceedingly interesting conversationalist.

He had been an active member of St. Louis Chapter since 1941.

Arthur G. Green

Arthur G. Green, 51, Sales Manager for the Bay State Abrasive Products Co., Westboro, Mass., recently passed away in Memorial Hospital, Worcester, following a serious operation.

He was a graduate of Worcester Polytechnic Institute in the class of 1918. Before joining Bay State in 1944, he was with Norton Company for 27 years.

Mr. Green was a member of Worcester Chapter, ASTE, the Worcester Sales Executive Club and Gen. Devens Post, A.L., a director of Westboro and Worcester Country Clubs.

Lester St. Clair

Lester St. Clair, 49, Master Mechanic for the Studebaker Corp. since 1936, died April 14 at his residence in South Bend, Ind., after an illness of 18 months.

He was employed by Studebaker in 1920, becoming Chief Toolmaker 10 years later. In the capacity of Master Mechanic he had supervised two of the company's larger projects, the introduction of the Champion model in 1938 and the production of motors used in the Flying Fortresses during World War II.

Mr. St. Clair was born in Batesville, Ind., and went to South Bend from New Castle, Ind. He was a charter member and the first Vice-Chairman of South Bend Chapter, ASTE. Since that time he had served continuously on the Chapter Board of Directors. He was also a member of Morris Park Country Club.

Dorizas Tells How U. S. Can Defeat Communism

Philadelphia, Penna.—Dwelling on the Russian threat to world civilization and the democratic form of life, Dr. Michail Dorizas, Professor of Geography at Wharton School of Finance and Commerce, University of Pennsylvania, told Philadelphia members how the United States can overcome Communism, in a recent address before the Chapter.

Tracing the rise of Communist power from 1917 and a secret police of 800,000 to the present time, Dr. Dorizas stated that the Nazis learned their methods from Russia.

Communists, he asserted, aim to establish an international commonwealth with a compulsory work program and a planned socialized economy without armies and facilities to make war, where each person shall live according to his individual abilities and needs.

Would Be Achieved by Violence

These objectives, he added, would be effected by revolution, bloodshed and terrorism; destruction of capitalistic government, family unity and religion.

The world and particularly the United States, he continued, can defeat Communism by: 1. Making democracy work and solving distribution problems as we have production so there will be fewer unemployed and hungry to fall easy prey to subversive influences. 2. Maintaining supremacy of the air. 3. Ending appeasement. 4. Broadcasting to the world the superiority of our system of government. 5. Developing the best possible Intelligence Service.

In closing, Professor Dorizas stated that there are only two major powers in the world today, the United States and Russia. The British Empire, on the brink of bankruptcy, has lost prestige in being unable to maintain its world responsibilities, colonies, and position in international trade.

Power Spreading

Soviet influence, he reminded, should not be underestimated. Commenting on their practice of boring from within with underground tactics, the speaker called attention to the increase of Russian power through Quislings in the satellite nations of Finland, Czechoslovakia, Poland and Yugoslavia. Greece has been undermined, and in France the Communist party has the upper hand. Meanwhile, the Russian people are today worse off than during Czarist times, he concluded.

After Professor Dorizas' address, a film, "Precision Thread Grinding," was shown through the courtesy of Jones & Lamson Machine Co.

During the business session which preceded the speaking program, retiring Chairman Howard Gross installed the officers for the coming year. The new officers are: Arthur R. Diamond, Chairman; Samuel R. Boyer, First Vice-Chairman; Emil Kitzman, Second Vice-Chairman; W. Warren Cady, Secretary; and H. F. Holden, Treasurer.

After the installation, Chairman Diamond introduced his committee chairmen: Constitution and By-Laws, Howard W. Gross; Editorial, James F. Barnes; Membership, Leroy S. Paulsen; Industrial Relations, Arthur C. Jackson; Standards, Leonard Subber; Program, Samuel R. Boyer and Emil Kitzman, Co-Chairmen.

Public Relations, Clarence H. Hopper; Education, James A. Brooks, Jr.; Entertainment, John P. Clark, Jr. and Joseph Denihel, Jr., Co-Chairmen; Register and Reception, Charles K. Lennig, Jr.; Ways, Means and Finance, Francis J. DeFrates; Good and Welfare, Foster M. Crayton; and Past Chairmen's Advisory, John Noble.

Alternate P. A. Patterson presented Mr. Gross with a briefcase, the gift of the retiring Executive Committee in appreciation of his leadership during the past year.

Coming Meetings

BOSTON — October 30-31, November 1, Hotel Statler, ASTE Semi-Annual Meeting.

LITTLE RHODY—June 18, Annual Outing. Place to be determined.

ST. LOUIS—July 26, Annual Stag Picnic, Tamme's Grove, Fenton, Mo. Diversified sports activities, valuable prizes.

Metal Forging Originated In Caves by Early Man

Syracuse, N. Y.—"The forging method is not a modern art, it dates back to the beginning of man," Waldemar Naujoks, Chief Engineer, The Tool Improvement & Forge Co., Cleveland, Ohio, told the members and guests of Syracuse Chapter at the April 15 meeting in the Onondaga Hotel.

Mr. Naujoks traced the history of forging from the time when crude hammer work was done in caves to create sufficient draft for the fires to heat the metal.

In contrast, modern gravity and steam forging presses produce intricate parts previously thought impractical and too costly. Several slides were used by the speaker to illustrate various types of work and the steps necessary to attain the desired finished forging.

Ray Coseo reported on his experience as Chapter representative in the House of Delegates at the Annual Meeting.

Top: Prominent in the joint meeting conducted by Dayton chapters of three technical societies are, from left: Robert Kuntz, First Vice-Chairman, ASTE; Walter Blank, affiliated with ASTE, ASME and ASM, and master of ceremonies for the occasion; Dr. Hans Ernst of Cincinnati Milling Machine Co. and speaker of the evening; Burson Treadwell, Chairman, ASME; and Roger Edmonson, Chairman, ASM. Below: Dr. Michail Dorizas (rear center), University of Penna., contemplates address he is to deliver at Philadelphia Chapter dinner meeting. Around table in foreground, from left, are: Two guests, T. H. Olson, Education Committee; C. H. Hopper, Public Relations Chairman; J. A. Brooks, Jr., Education Chairman; A. C. Jackson, Industrial Relations Chairman; E. O. Burton, and (right) Foster M. Crayton, Good and Welfare Chairman

Moving?

Tell us your new address so *The Tool Engineer* can go with you. Mailed under a bulk rate, magazines are not forwarded by the Postoffice Department, but are returned to the sender if they cannot be delivered at the address indicated.

Send your address change to American Society of Tool Engineers, 1666 Penobscot Bldg., Detroit 26, Mich.

Elected Vice-President

Syracuse, N. Y.—Allen C. Siegel, Factory Manager of Doyle Manufacturing Corp., has been elected Vice-President in Charge of Manufacturing by the company's Board of Directors.

Mr. Siegel, who joined the Doyle organization about a year ago, was formerly Factory Superintendent of Uebelhoer Bros., Inc., Buffalo. He is a Past Chairman of the ASTE Chapter at Buffalo.

Three Societies Sponsor Metal Cutting Meeting

Dayton, Ohio—Sponsors of a recent joint meeting were the Dayton Chapters of ASM, ASME and ASTE.

Dr. Hans Ernst, Director of Research, Cincinnati Milling Co., was the speaker of the evening. His lecture, "New Advances in Metal Cutting," was valuable to members of all three groups.

Walter Blank, Tool Supervisor of National Cash Register Co. and a member of all three organizations, acted as master of ceremonies.

* * *

On April 14 an educational program was presented. National Education Chairman Otto W. Winter, scheduled as guest speaker, was unable to be present, but several Chapter members substituted very capably.

Paul Snyder, Chapter Education Chairman, presided at the meeting and introduced the speakers: Edgar Seifreat, George Goodwin, Adam Lensch and William Carper.

BULLETINS AND TRADE LITERATURE

Items briefed herein have been carefully selected for their interest and application. Unless otherwise stated, all are available, free, from the stated sources.

GROBET FILE CO. OF AMERICA, INC., 421 Canal St., N. Y. 13, has a 24-page booklet, *Grobet Precision Swiss Files*, listing patterns, sizes and cuts of hand and machine files and rifflers, special files, rotary and deburring files, and countersinks. Available in nine gradations of cut—Nos. 00, 1, 2, 3, 4, 5, 6 and 8—Grobet's No. 00 corresponds to bastard cut; Nos. 0-1 to second; No. 2 to smooth cut; and Nos. 3-4 to super smooth cuts.

THE TEXAS COMPANY, 135 E. 42nd St., N. Y. 17, has a 46-page booklet, *Lubricants & Coolants for Cutting & Grinding* which explains, by use of charts and photos, the fundamentals of proper coolant usage as applied to a wide variety of cutting operations.

WESTINGHOUSE ELECTRIC CORP'N, P. O. Box 868, Pittsburgh 30, Pa., has included considerable data in a 20-page booklet, *No. B-3853*, describing five types of a.c. magnetic crane controls for handling any type of load.

LYON-Raymond Corp'n, 3355 Madison St., Greene, N. Y., has released *Bulletin 221*, outlining features of their new Hydraulic Hand Pallet Lift Truck, which weighs only 225 lbs., but has a carrying capacity up to 1 ton.

ALLEGHENY LUDLUM STEEL CORP'N, Pittsburgh, Pa., has compiled a 36-page booklet, *Allegheny Metal in the Petroleum Industry*, picturing the role played by stainless steel in the production and processing of oil.

AJAX ELECTRIC CO., INC., Frankford at Delaware, Philadelphia 23, Pa., manufacturers of Ajax-Hultgren Electric Salt Bath Furnaces, have published a 72-page *Catalog No. 116*, devoted to electric salt bath heat treating and processing. The booklet is available to metalworking executives and metallurgists when requested on company letterhead.

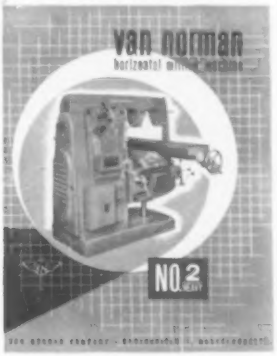
PERSSON MFG CO., 2 Henry St., Bloomfield, N. J., has published a leaflet, *Persson Safety Die Jack*, featuring their effective and handy tool for separating and assembling die sets.

HYDRO-POWER, INC., Springfield, Ohio, has included information in *Bulletin No. 460* on its complete line of hydraulic high pressure pumps, valves, controls, boosters and packaged hydraulic power units.

LUSTRA CORP'N OF AMERICA, 40 W. 25th St., N. Y. 10, has issued *Bulletin No. 103* wherein four types of light bulbs are described—all especially designed for rugged-duty service where ordinary light bulbs fail to stand up.

Specialized horizontal boring machines are presented by **BARRETT MACHINE TOOL CO.,** Meadville, Pa., in *Booklet B-2000*.

FORD MOTOR CO., Johansson Div'n, 3650 Schaefer Rd., Dearborn, Mich., has a 16-page folder, *Johansson Gage Blocks & Accessories*, describing the famous "Jo-Blocks," which have done so much to make millionth-inch mechanical accuracy a reality.



VAN NORMAN COMPANY, Springfield 7, Mass., has a new folder called *Van Norman No. 2 Heavy Horizontal Milling Machine*, which emphasizes features of this miller such as the heavy built-in spindle fly-wheel for dampening, the use of five bearings for maximum spindle support, heavy-duty column, front and rear directional controls, as well as an improved overarm.

DETROIT REAMER & TOOL CO., 2830 E. Seven Mile Rd., Detroit 12, has issued a 67-page *Catalog No. 7* explaining its facilities for precision production of a wide range of high speed steel and carbide tipped special cutting tools. Twenty-five pages of trig tables are included at the rear of the catalog for handy reference.

BUCKEYE TOOLS CORP'N, Dayton 1, Ohio, has available, among other releases, a 52-page catalogue called *Buckeye Pneumatic Tools*, describing the company's line of rotary type pneumatic tools including grinders, buffers, disc sanders, drill and reamer tools, screwdrivers and nut runners.

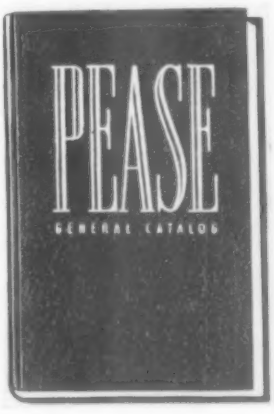
D. A. STUART OIL CO., LTD., 2727-49 So. Troy St., Chicago 23, has published a folder, *Stuart's Controlled KleenKut*, explaining how KleenKut water-mix cutting oil makes for "better products, increased production and lower cost."

ETTCO TOOL CO., INC., 594 Johnson Ave., Brooklyn 6, N. Y., has a 16-page *Bulletin No. 31*, setting forth advantages of the Ettco-Emrick System & Equipment for multiple drilling and tapping of small parts.

EDWARD BLAKE CO., 634 Commonwealth Ave., Newton Centre 59, Mass., has available copies of *Bulletin 466*, setting forth features of the Blake Flute Grinder for grinding the straight or spiral points of taps.

FONDA GAGE CO., Stamford, Conn., has illustrated its line of Fonda Lifetime-Carbide Gage Blocks and Fonda "Ultra-Finish" Steel Gage Blocks in *Bulletin 46-P*.

ECLIPSE FUEL ENG'G CO., Rockford, Ill., announces a booklet, *"Rotair" Recirculating Air-Draw Furnaces*, describing their gas-fired furnaces designed for heat treating below 1250° F.



The 238-page *Pease General Catalog*, now in its tenth edition, contains over 150 illustrations, many diagrams, and abundant information on the company's line of blueprinting and whiteprinting (dry direct process) machines and accessories, also sensitized papers and cloths, drafting room furniture, and photographic arc lamps. Copies available by writing on company letterhead to **C. F. PEASE COMPANY,** 2601 W. Irving Park Rd., Chicago 8, Ill.

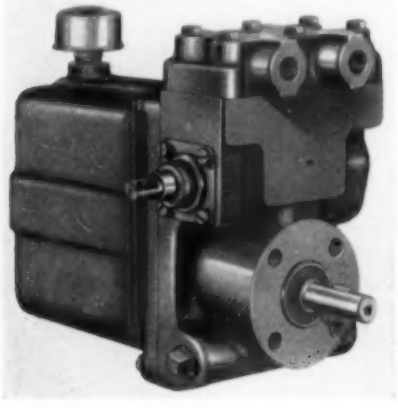
TOOLS OF TODAY

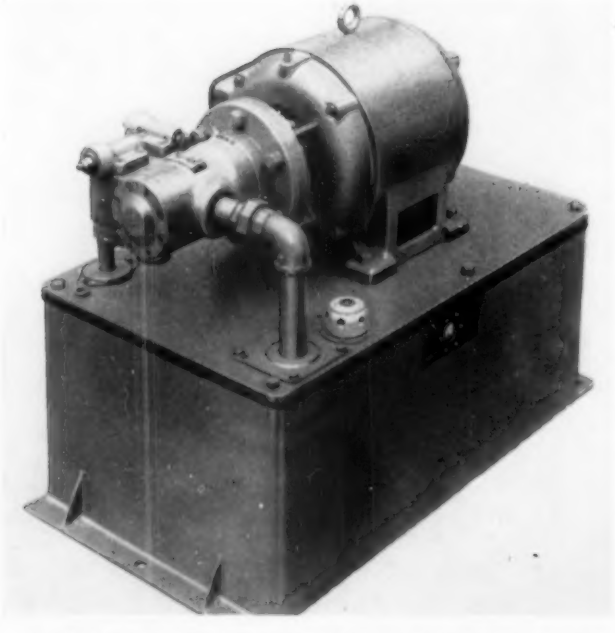
New Hydraulic Units

TWO NEW DEVELOPMENTS by *Vickers, Inc.*, 1416 Oakman Blvd., Detroit 32, include a low cost Hydraulic **POWER PACK,** *upper photo,* and a self-contained Hydraulic **POWER UNIT,** *lower photo.*

The POWER PACT combines several Vickers basic products in one self-contained "package." It is composed of a vane pump, relief valve, various combinations of single and double operating valves, an oil tank, oil filter and air cleaner. The compact 45 lb. unit can be directly attached with V-belt, chain or gears, to any power drive.

Efficient and durable, the Power Pack is not only being used for power operation of farm implements, road construction and maintenance equipment, industrial machinery, and materials handling equipment, but many other uses are being constantly devised for jobs where, previously, it has been economically impractical to employ hydraulic power operation.





Available with nominal pump delivery of 2, 3, or 5 g.p.m. at 1200 r.p.m. and 1000 p.s.i., the Power Pack develops hydraulic pressure to lift, lower, push, pull, stack, load and hold any load, depending on the cylinder size used.

The Vickers POWER UNIT, which is a self-contained unit for hydraulic systems, combines an oil reservoir, pump, suction filter, combination filler cap and air cleaner, oil level gage and other accessories for a complete power source for hydraulic systems. The pumps are arranged to accommodate electric motor of users' selection.

For installation convenience of hydraulic equipment on industrial machinery, Vickers Power Units are available in standard sizes and types of 20, 30 and 60 gallon tank capacities equipped with Vickers constant delivery vane type pumps. Three types of pumps are available in a wide range of capacities; single stage (1000 p.s.i.) and two pressure, as well as two stage for 2000 p.s.i. continuous duty operating pressures.

Detailed information on the POWER UNIT may be had in Vickers Bulletin No. 46-43, and of the POWER PACK in Bulletin No. 46-48.

"Thermocreaser" by Taber

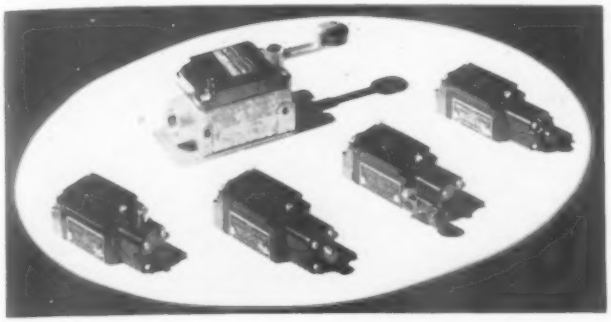
KNOWN as the **"THERMOCREASER,"** the latest Taber-pioneered development greatly expedites sheet plastics fabricating and produces a 90° crease, or fold, on 5-20 pt. plastic sheeting up to 30" wide at speeds eclipsing those commonly possible heretofore under normal production conditions. It is specifically designed for use in making square set-up boxes and other type transparent packages, novelties and other items requiring right-angle creasing or folding.

The machine is hand-fed, foot-operated, and so simple to use, the manufacturer reports, that operators with only short training and practice can right-angle-crease or fold sheeting with repetitive uniformity on a volume scale formerly unobtainable. Fast folding is achieved through "instant-crease" action, based on a unique Taber perfected principle. An accurately heated, "thermostatically-controlled" blade, which comes in contact directly with the sheet stock, presses it into a metal forming die or a resilient sponge-rubber pad.

In utilizing a metal die as a basic forming medium, the machine reportedly enables an operator to closely control the actual creasing or folding cycle, thus obviating under- or-overcreasing "kinks" usually resulting from below standard operation. According to the maker, all that is needed to turn out a perfect 90° crease or fold, with this equipment, is to vary the operating speed of the machine or adjust the temperature of the creasing blade according to the gauge of sheet being fabricated. Complete details may be had from Plastics Equipment Division, *Taber Instrument Corporation,* Dept. TE, 111 Goundry Street, North Tonawanda, N. Y.

Limit Switches by G-E

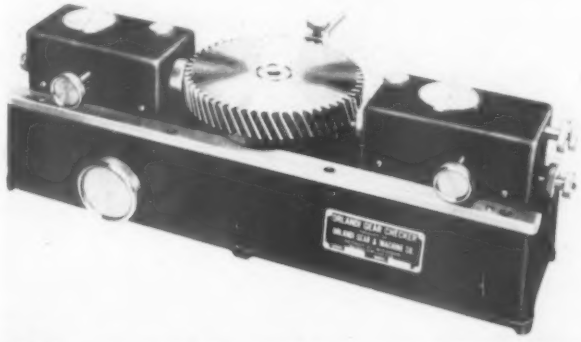
THE LIMIT SWITCH line of *General Electric Co.*, Schenectady, N. Y., has been expanded by the addition of a new small oilproof **TRACK-TYPE SWITCH** designed for machine tool or similar applications. The switch can be used in a variety of operations through use of interchangeable operating heads for roller-lever, roller-push-rod, push-rod, or plunger operation.

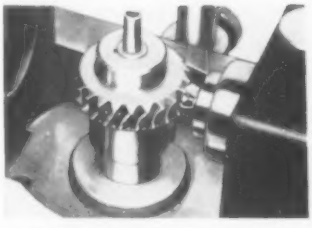


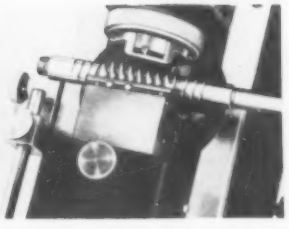
The new switch contains a single-pole, double-throw, self-contained, snap-action control Switchette. A sturdy, molded phenolic enclosure of oilproof construction protects it from lubricating or cutting oils and compounds. In addition to the new small switch, the standard line of track-type limit switches has been redesigned to provide such features as snap action, oilproof construction, and improved appearance.

Production Gear Checker

A NEW **GEAR CHECKING MACHINE,** of revolutionary design, that makes possible rapid, accurate high production checking of spur and helical gears with pins and balls, is announced by *Orlandi Gear and Machine Co.*, 16221 Meyers Road, Detroit 27, Michigan.





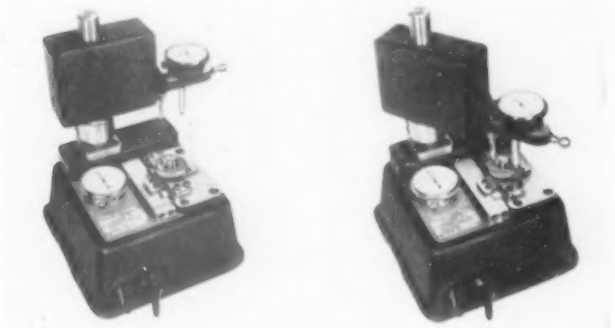


Visual checking of pitch diameter, concentricity, size, tooth spacing, backlash and parallelism can be performed as fast as an operator can lift one gear, and replace it on the anvil or locating pin with another. This implies several hundred pieces per hour.

As claimed by the manufacturer, large and minute spur, helical and worm gears, plain and cluster, can be checked with high fidelity even by inexperienced help. The machine can be easily converted for rapid three-wire checking of any thread form, or for use as a comparator in checking precision parts. An 8-page brochure, available on request, illustrates and describes the functions of this new machine.

New Checking Gage

Bryant Chucking Grinder Co., Springfield, Vt., announces a new **SQUARENESS-OF-FACE GAGE** for checking the important relationships between the pitch diameter of a thread and the face of the part, which may be mounted on any Bryant Thread Gage. The face gage consists of a movable arm which carries a large dial indicator and two contact points which are adjustable to cover the capacity of the thread gage. The inner contact serves as a pilot and compensates for thread progression as the part is turned for inspection. The front contact actuates the dial indicator on the face gage.



Operation of the gage is as follows: The control lever withdraws the thread segments behind guides, the part is positioned and the three-thread segments are engaged (left photo). The part is thus given one-third of a turn for all-over thread inspection, which is recorded visually on the thread gage dial indicator.

The Squareness-of-Face Gage is then swung into position (right photo); and a half turn more checks the right angularity which is recorded visually on the other dial indicator.

The control lever is then actuated, allowing the part to be lifted from the gage, thus eliminating unscrewing the part off the thread segments. No "feel" is necessary for inspecting; thus, unskilled operators can run the Bryant gage at high speed and with complete accuracy. Squareness-of-Face Gages cover capacities from $\frac{3}{8}$" to 8" internal thread diameter and are furnished with a master setting ring with one face ground square.

Pillow Blocks & Flange Units

SELF-ALIGNING BRONZE **PILLOW-BLOCKS AND FLANGE UNITS**—as announced by *Anti-Friction Bearings Co.*, 2020 S. Figueroa St., Los Angeles 7—feature a split, high tensile strength aluminum housing which carries a spherical naval bronze bearing.

Inserted in the bronze bearing, is a ground adapter sleeve so that one basic pillow block can serve a number of shaft diameters. Once the shaft has been located, the housing is clamped on the spherical, self-aligning, bronze bearing to provide a rigid bearing for taking either radial or thrust loads. The trade-name of the line is "Imperial"; and includes sizes ranging from $\frac{5}{8}$" to 3" shaft diameters, and for speeds up to 5000 rpm, in both pillow blocks and flange units.

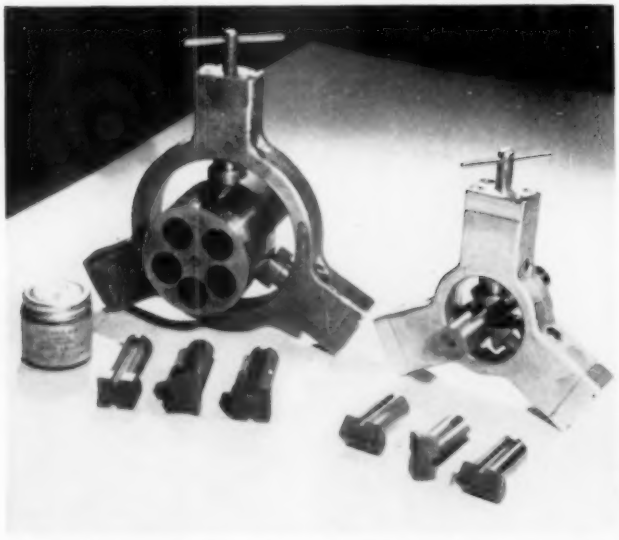
Automatic Inspection System

AN AUTOMATIC **INSPECTION SYSTEM** for small parts, announced by *Arma Corporation*, Brooklyn, N. Y., inspects, counts, sorts parts, and places them in accepted and rejected groups. In conjunction with a range of precision components, also furnished by Arma Corp'n, it offers inspection stations to meet the needs of every type of industry. The tool is adaptable for both

manual and hopper feeds, no particular skill is required for its operation, and it has a broad range of adjustable tolerances, with speeds up to 7,000 pieces per hour. The manufacturer claims that change-over from one part to another, or from one dimension to another can be effected in a matter of minutes.

New O. D. Honing Tool

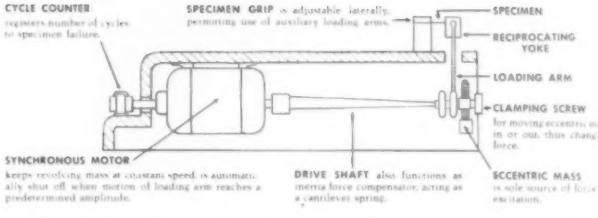
A NEW LAPPING OR **HONING TOOL**, for outside diameters, has been developed by *Walter J. Papciak*, 14413 Westwood, Detroit 23. The tool has many unique features, one of which is its broad range as compared to conventional outside lapping and boring tools. Actually, the tool consists of two holders, contained in a kit together with extra inserts and three jars of lapping compound, that will insure finish to within 5 micro-inches. The smaller holder has a range .0625" to 1.500", and the larger from 1.500" to 3.25". The inserts, of Meehanite, can be interchanged and adjusted in a little over a minute and, once adjusted, will lap cylindrical bodies perfectly straight and round.



To all practical purposes, the three inserts act as cutters, and it is claimed that, on hardened cylindrical parts—as plug gages for example—as much as .006" can be removed in about 4 minutes. The tool is especially designed for the lapping of plug gages, guide pins and other round parts.

Flexure Fatigue Tester

TO MEET DEMAND for a bench-type **FATIGUE TESTING MACHINE** with "constant force" loading feature, the *Baldwin Locomotive Works*, Philadelphia 42, has developed the Sonntag Model SF-2 machine. This machine affords flexure tests on sheet stock of any material—metal, plastic, wood—and requires no attention during the test. Furthermore, the unique design eliminates the need for any electronic equipment, complex linkage or special devices to maintain a constant force during test of specimen.

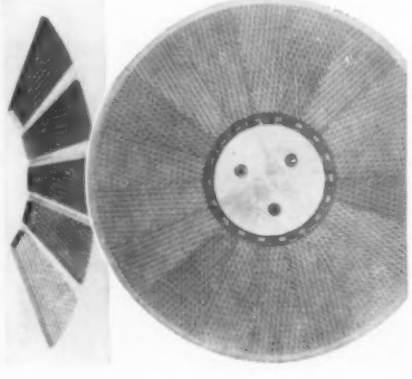

CYCLE COUNTER
registers number of cycles to specimen failure.
SPECIMEN GRIP is adjustable laterally, permitting use of auxiliary loading arms.
SPECIMEN
RECIPROCATING YOKE
LOADING ARM
CLAMPING SCREW
for moving eccentric mass in or out, thus changing force.
SYNCHRONOUS MOTOR
keeps revolving mass at constant speed; is automatically shut off when motion of loading arm reaches a predetermined amplitude.
DRIVE SHAFT also functions as inertia force compensator, acting as a cantilever spring.
ECCENTRIC MASS
is sole source of force excitation.

Essentially, the unit uses a revolving eccentric mass as a means of loading the specimen, thus avoiding cams or eccentric connecting rods which require readjustment during the test as the stiffness of the specimen changes. A predetermined load is alternately applied, and the resultant deflection is incidental. A diagrammatic cross section of the Sonntag SF-2 machine is shown in the lower photo.

New K-M Disc File

AMONG RECENT developments by *Kennametal, Inc.*, Latrobe, Pa., is a **DISC FILE**, designed to facilitate the facing of rough castings and the removal of unwanted projections—as flash, draft, gates and risers—from plastic and die cast parts. The tool consists of double cut segments, of solid Kennametal, securely dovetailed and wedged into a 12" diameter steel body which can be mounted and driven by any suitable stand, vertical or horizontal.

The teeth are formed and positioned so that material being dressed is sheared off, in clean cut strips, much after the manner of conventional metal cutting tools. As decided advantages over ordinary disc grinding, the tool provides for higher production with better working condition, since material is removed in curled chips rather than as dust. Also, less heat is generated, with long tool life and the elimination of frequent changes.



Vapofier Atmosphere Producer

THE VAPOFIER **GAS GENERATING UNIT,** by *Vapofier Corporation*, 10316 South Throop St., Chicago 43, utilizes fuel oil to generate Vap-O-gas, which is burned in the combustion chamber of atmosphere producing equipment. The products of combustion are then taken through condensers which remove the water, and the resultant atmosphere is delivered to the furnace under any desired pressure.

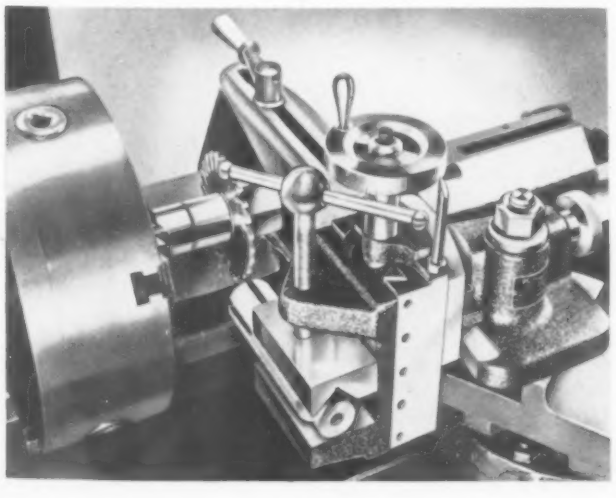
A desirable feature of the Vapofier is that fuel-air ratio may be predetermined and maintained, without change in manifold pressure, throughout the entire range of capacity. Also, the flame quality may be varied widely from oxidizing to reducing, and once the proper analysis of products of combustion are determined, the unit may be set so that it will constantly produce the same results regardless of demand.

The Vapofier occupies only 2 x 4 ft. of space, and the units are built with capacities from 70,000 to 2,000,000 B.T.U.'s per hour. The gas generating unit is controlled by any standard automatic control instrument and, since premixing equipment is built in, it provides a highly efficient method of mixing any gaseous fuel. Therefore, it serves ideally where standby facilities for utility gas are of interest.

Lathe Milling Attachment

A NEW DEVELOPMENT in quick change lathe tools is a **MILLING ATTACHMENT** offered by *Kyle-Johnson Machine Co.*, 1627 West Pico Blvd., Los Angeles 15, Calif. This new attachment fits in with the K-J Adapter Base and quick change system of lathe tooling; and, like other K-J attachments, can be mounted on any engine lathe in a matter of seconds. This enables the operator to perform any light milling job, such as acurately milling keyways, flats, and small shafts.

Of all-steel construction, the attachment—which may also be employed as a drilling vise—can be used on simple milling work, thus supplementing other machines. Graduated in thousandths, and with a vertical travel of 6", it is flexible enough to permit angle milling, and it may be tilted as desired by the operator. Jaw opening is 2⅞". Complete details may be had from the manufacturer.



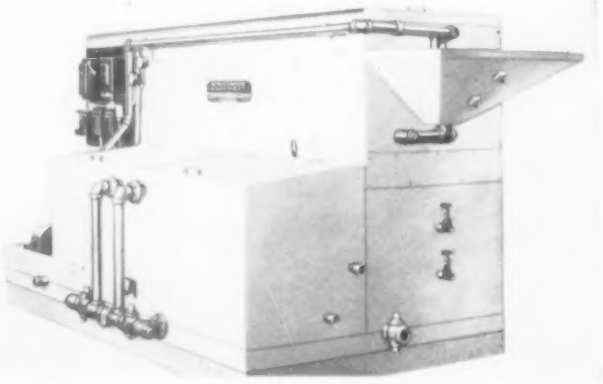
Index Table by Kaukauna

AN **INDEXING TABLE**—Model 700—by the *Kaukauna Machine Corp'n*, Kaukauna, Wis., is designed and built to support heavy workpieces without deflection. While originally intended for use with the Kaukauna Series 125 Portable Horizontal Drilling & Tapping Machines, the unit is adapted for use with many other types of machine tools. It is also ideally suited for inspection or layout work because of its unusual flexibility and rigidity.

The main bed is of heavy well-ribbed cast iron construction, with T-slots in the top and at each end. Thus, work can be held in either the horizontal or vertical plane, and may also be set-up on one end of the table while work is being machined at the other end, thereby saving valuable machine operating time. A manually operated 36" diameter indexing platen, also of heavy well-ribbed cast iron construction, which can be locked in any position, is in the center of the main bed. It is supported by an extra capacity ball thrust bearing; and a hardened steel plunger and hardened steel bushings assure positive indexing positions. T-slots in the platen are provided for workpiece clamping, and two easily adjusted shoes clamp the platen firmly in position. Over-all dimensions of the unit are 72" x 36¼"; with table height, 29". Full details may be had from the manufacturer.

New Washer and Dryer

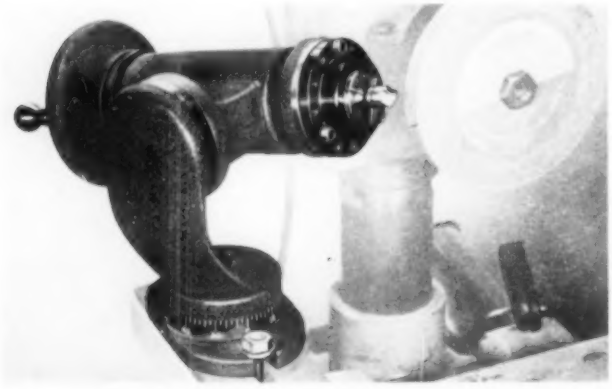
A NEW screw-drum type, **WASHER & DRYING MACHINE,** announced by *Optimus Equipment Co.*, 313 Church St., Matawan, N. J., manufacturers of metal washing machines and dryers, can be used for washing and drying metal parts, rinsing and drying them, or any portion of these operations. The new machine can also be adapted for a wash-drain, rinse-drain, cold or hot air dry sequence, or for pickling operations. It is particularly designed to handle difficult rinsing and drying jobs involving screw machine or small stamped parts.



The dryer end of the machine is completely closed to avoid air loss, and the air stream, passing through a heater and blower, provides for either hot or cold air blast system. All parts of the machine are readily accessible for lubrication, maintenance or alterations. Centralized lubrication may be provided.

Relief Grinding Fixtures

MODEL 100-B is a new I-G-C **RELIEF GRINDER** recently added to the line of relief grinding fixtures manufactured by *Accurate Machine Products Co.*, 1640 South Hobart Blvd., Los Angeles 6, Calif. It is designed to handle countersinks, center drills, integral pilot cutters and pilot drills, either right or left hand. The attachment fits any standard grinder, and handles work from 1/16" to 1" diameter with standard Type 5-C Hardinge Collets.



The mounting knee has been redesigned so that the working head can be set at any desired position. Lift of the single cam is variable from .001" to 1/8", thus grinding for correct rake or clearance angle in addition to relief. Special built-in indexing pins provide for faster and more accurate grinds; and adjusting pins provide for 1, 2, 3, 4 and 6 fluted cutter grinding.

The tool, which can also be employed for any type of small tool cutter grinding such as the sharpening of end mills, spot facers and small milling cutters—is available for immediate delivery and comes complete, ready for installation, with one collet and two wrenches.

All Angle Radial Arm

THE *Empire Foundry & Machine Corp'n*, Ashland, Ky., announces the **ALL ANGLE RADIAL ARM,** designed to be mounted on standard 2", 2¼", 2½" or 2¾" column drill presses. The attachment eliminates necessity of a tilting, or universal table for drilling holes at any desired angle and most any radius. The arm increases chuck-to-column capacity by 16", while an auxiliary column —which can be furnished—increases chuck-to-base capacity 5".

The Radial Arm is clamped firmly to a base collar by bolts through a degree table graduated through 90° (45° right to 45° left), and permits easy adjustment of drill head to any desired drilling angle. The base collar is equipped with a coordinate clamp lock, with ball handle that releases or tightens two clamping wedges simultaneously. This simplifies raising or lowering the drill head and permits swinging the drill head and radial arm.

New Hy-Draulic Slotters

TWO LARGE Hy-Draulic **SLOTTERS,** recently introduced by the *Rockford Machine Tool Co.*, Rockford, Ill., include the new 48" stroke slotter and the improved 36" slotter. The machines are designed with massive columns to provide rigidity for the heaviest duty. The ram may be set for vertical travel, or may be tilted off-vertical up to 15°; and cutting and return stroke speeds are infinitely adjustable over a wide range to take full advantage of all working conditions. Because the ram is hydraulically driven, cutting and return strokes are smooth, resulting in accuracy and fine finish. Stroke lengths are easily set, by valve control, as desired.

For simplified operation, all electrical and hydraulic controls are centered in a push button panel on the column. Controls include "inching" of the ram, for easier setup. The table provides three types of work feed—rotary, transverse and longitudinal—while gear ratios afford effortless manual table operation during set-up.

While full information may be had from the manufacturer, specifications will be briefly outlined. Stroke lengths, of the 36" and 48" machines are 6"-36" and 6"-48" respectively; maximum distances, table to lower face of tool head, 54" and 60", respectively; cutting speed range (f.p.m. for both models) 0 to 80 ft.; table diameter (both) 42"; transverse table travel (both) 36"; and table feed range (both) 0" to 140" in transverse, longitudinal and rotary.

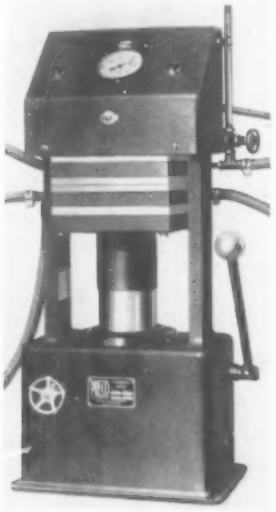
New Power Screw Drivers

Keller Tool Co., Grand Haven, Mich., announces two new pneumatic **POWER SCREW DRIVERS,** especially usable for driving small screws on a production basis. While superficially similar, Model 1671 (Size 12A-1) has a free speed of 2,500 r.p.m. and is designed for delicate operations. It drives free-running machine screws up to size No. 3, and very small self-tapping and wood screws.

Model 1672 (Size 12A-1C) has a free speed of 10,000 r.p.m. and accommodates screws size No. 3 to No. 6. Impacting force of the built-in clutch gives this model added drive. Special time-saving features include pneumatic pick-up, so that the operator can pick up screws with an air suction finder and drive them directly into the work.

Improved Preco Presses

To MEET A GROWING DEMAND among users of Preco **HYDRAULIC PRESSES** for a wide range of production and industrial testing uses, *Preco Incorporated*, 960 East 61st Street, Los Angeles 1, Calif., has announced a list of important modifications for the press. It is a bench-type unit developing 40,000 lbs. pressure and is equipped with a two-stage hydraulic pump—high speed stroke for quick closure and high pressure stroke for maximum squeeze.

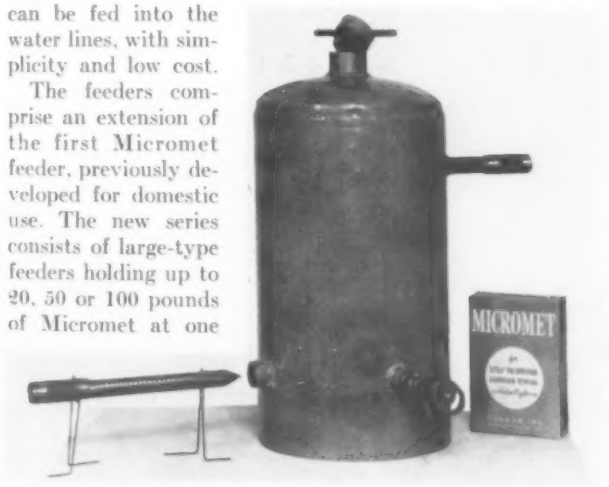


The Preco Press is now available in platens measuring 8¾" x 12", furnished either with 1500 watt electrical heating elements, which give fast heat acceleration, or for steam heating. This increased size platen press is meeting with particular success among industrial users, and especially laminators and photographers, as it handles standard sized photos and other large documents.

Triple platens, which double the capacity, and permit work to be inserted above and below an intermediate platen, also are available in both the 8" x 8" standard size and the new 8¾" x 12" size. The Preco Press is now available for either alternating or direct current; also, the press can be supplied to hook into hydraulic pressure systems, with considerable economy. Where steam lines are available, and it is desirable to utilize this heat source, platens for steam operating can be supplied. Complete details on these tools will be furnished by the manufacturer.

Micromet Feeders

FOR A COMMERCIAL, institutional or industrial establishment having corrosion or scale water troubles in hot water or cooling water systems—whether it uses 13,000 or 1,000,000 gallons per month—*Calgon, Inc.*, Pittsburgh, Pa., has developed a new series of **MICROMET FEEDERS** by which the chemical can be fed into the water lines, with simplicity and low cost.



The feeders comprise an extension of the first Micromet feeder, previously developed for domestic use. The new series consists of large-type feeders holding up to 20, 50 or 100 pounds of Micromet at one charge. The chemical dissolves slowly, rate 25% per month, so that only that much of the initial charge needs to be renewed each month. It is a modification of Calgon, which is being successfully used in more than 600 municipal water systems, and in many industrial installations to prevent lime scale and control corrosion.

New Drill Jig

A NEW **DRILL JIG**, providing for accurate drilling in any shaped part up to 2" diameter, is announced by *McCullough Manufacturing Co.*, 12709 Gratiot Ave., Detroit 5. A precision built machinists' tool, the jig will accurately accommodate drills up to ½" diameter, and a set of six bushings—1/16" to ⅜" inclusive—are furnished as regular equipment.

The tool is case hardened and ground all over, and is intended to withstand years of usage.

New Type Die Set

AN INNOVATION in **DIE SETS** is announced by *A. W. Grunow Co.*, 563 White St., Orange, N. J. This die set is made with a new type guide post bushing—called Die Master—made of phosphor bronze and tapered. By loosening a lock ring, the bushings may be expanded, for easier slip fit, or tightened to compensate for wear, as the case may be.

Because of the fine adjustment attainable, the punch holder always slides freely up and down, yet "stays put." These adjustable bushings (patented) will wear indefinitely although eventually both the bushings and the guide posts will wear to a point of looseness. Then, the guide posts may be re-ground and the worn bushings inexpensively replaced.

North East West South in Industry

ACME BROACH CORP'N, Lexington, Ky., has completed its new plant which is devoted exclusively to the manufacture of broaching tools. Another new structure is located to the rear of this main building, and plans are under way for a third.

R. F. HILBERT has been appointed Sales Agent for **Vascoloy-Ramet Corp'n** in the Rochester, New York area. Previous to establishing his own business in '45, he spent 17 years in the machine tool industry as a sales representative.

O. K. TOOL CO., INC., Shelton, Conn., has placed **David Bristol** in charge of the new Chicago District Office, with **Eugene Scovil** as representative for southern Chicago and northern Indiana, and **Frank Gaynor** to handle sales in Iowa and southern Illinois. **John A. Kobelenz** will be Dis't Sales Representative for the northern section of Ohio, succeeding **Frederick Schroeder,** deceased. Also announced are three new distribution centers: **A. C. Pletz Co.,** Cincinnati, with branch office in Dayton; **Rickert Industrial Supply** (successors to Camm-Blades) in Milwaukee; and **Martin & Prestegaard Company** for Minneapolis.

PAUL T. KEEBLER has been elected Vice-President of the **H. W. Keebler Mfg Company** of Pittsburgh, Pa., manufacturers of water purification equipment and special production machinery. Mr. Keebler, member of Pittsburgh Chapter ASTE, was previously with Phillips Mill & Mine Supply Co. as plant mg'r.

EDWARD F. DYKSTRA, formerly of Standard Safety Equipment Co., has been named Advertising & Sales Promotion Mg'r of the **D. A. Stuart Oil Co.,** Chicago.

BIG 3 WELDING EQUIPMENT CO., INC., of Ft. Worth, Texas, announces opening of a new sales and supply office at 565 W. Commerce St., Dallas, Texas. The company handles leading lines of welding equipment, including Lincoln Welders, Fleetwood Electrodes, Victor Oxy Acetylene Equipment, Taylor-Winfield Welders and Cleveland "Cleco" Air Tools.

E. H. Goddard, former vice-president & gen'l mg'r of **GODDARD & GODDARD CO.,** Detroit, has recently been elected President & Gen'l Mg'r of that concern. He replaces **A. N. Goddard,** founder, who will now serve as Ch'man of the Board. **L. H. Goddard** has been named Vice-President, and will also continue his activities in the sales field. **H. C. Henderson** has been re-elected Sec'y-Treas., and **S. H. Grattan** re-appointed Gen'l Sales Mg'r.

Marshall M. Smith, President of **E. W. BLISS CO.,** Detroit, announces that capacity has been doubled at the Salem, Ohio, Div'n, by addition of facilities for steel weldment production.

MORSE TWIST DRILL & MACHINE CO., New Bedford, Mass., announces opening of a new branch warehouse, located at 2952 E. Grand Blvd., Detroit.

Howard A. Hein, formerly chief sales eng'r for **CLEVELAND AUTOMATIC MACHINE CO.,** Cleveland, has been named Detroit Branch Office Mg'r for that concern, according to **John J. Prohaska,** Gen'l Sales Mg'r.

New Office Mg'r of the Detroit plant of **Quaker Chemical Products Corp'n** of Conshohocken, Pa., is **GEORGE HORTON,** formerly of the Chrysler Motor Corp'n.

DAVID M. HALLIER, since '43 assistant sales mg'r of **Nat'l Tool Company,** Cleveland, O., has been named Sales Mg'r for that concern, according to announcement by **Harry W. Barkley,** Executive Vice-President and Gen'l Mg'r.

Sebastian Lathes are now being manufactured by **KING MACHINE TOOL CO.,** manufacturers of vertical boring and turning machines, Tennessee & Paddock Roads, Cincinnati, Ohio. Distribution is being handled by **D. C. Morrison,** 937 Edwards Bldg., Cincinnati.

ACME-DANNEMAN CO., INC., 203-205 Lafayette St., N. Y. 12, has been appointed exclusive national distributor for the "Cent-a-matic" driver, which was described on p. 60, March '47 issue, *The Tool Engineer.*

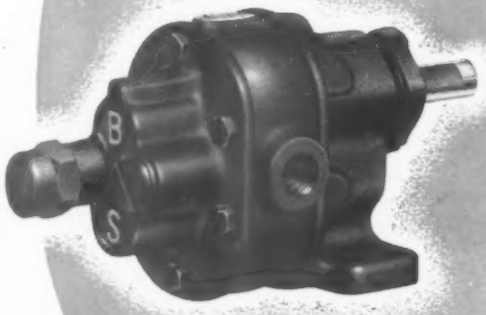
U. S. BROACH CO., Detroit, announces election of **Arthur A. Atwell** as Director and Senior Vice-President; also the election of **E. H. H. Graf** to the position of Vice-President in Charge of Sales and Eng'g.

ACME SCHOOL OF DIE DESIGN ENG'G, 129 W. Colfax Ave., South Bend 8, Ind., has recently increased its activity by establishing Resident Schools in Chicago and Detroit, as well as Dayton, Ohio.

FEDERAL PRODUCTS CORPORATION, manufacturer of dial indicators and other precision measuring instruments, has greatly expanded manufacturing facilities. Shown is a view of the Eddy St. plant, Providence, R. I., after modernization which includes addition of a third story and other extensions effected to meet consumer demands.

Motor-Driven Centrifugal Pumps for coolant supply

Pumps that back up your design



Rotary Geared Pumps for general purposes

Rotary Geared Pumps Reversible Type for general purposes

Rotary Geared Pumps for hydraulic service

YOU'VE MADE SURE of everything about your machine design . . . including lubrication, coolant supply and hydraulic service. Now make sure that the pumps you specify back up your design—specify Brown & Sharpe Pumps.

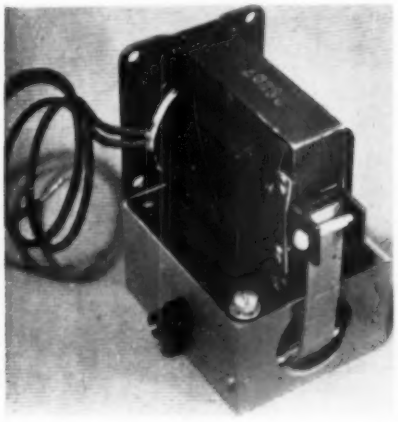
Everything about these pumps . . . design, materials and manufacturing . . . is the result of long experience in fulfilling the pump requirements for machine tools and other machine equipment. The aim of Brown & Sharpe in making this complete line of pumps is to provide the correct type of service, a completely dependable service and an enduring service for every pumping need.

Write for pump catalog which gives detailed specifications on the complete line of Rotary Geared, Vane, Centrifugal and Motor Driven Pumps. Brown & Sharpe Mfg. Co., Providence 1, R. I., U.S.A.

B·S *We urge buying through the Distributor*

Two-Way Solenoid Valve

A COMPLETE 110 volt a.c. solenoid **TWO-WAY VALVE,** for use on all types of machines where continuous duty is desired, is announced by *Electrol, Incorporated,* Kingston, N. Y. Compact and sturdy, this hydraulic unit accommodates operating pressures from 0 to 1500 p.s.i. (higher if required) and, while primarily intended for use with oil, can readily be adapted for other fluids. The valve, which is supplied in normally closed or normally open positions, is available in four NPT pipe sizes — $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$ and $\frac{1}{2}$ inches.

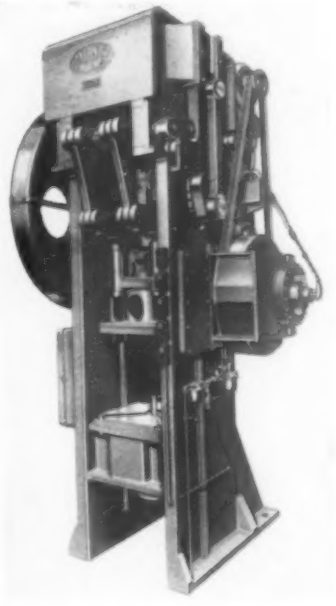


The valve housing is made of heat treated aluminum alloy, with the enclosed poppet and seat made of hardened and ground steel which form a balanced valve that assures long and reliable service. The positive sealing O-rings are of standard design and size. All exposed metal parts are protected from corrosion.

A heavy duty 110 volt 60 cycle solenoid is mounted on top of the valve housing, with motion transmitted to the valve plunger by a lever which assures positive and accurate operation of the valve. Two 10" lead wires are provided. Similar valves can be supplied in 12-24 volts d.c.

New Presses by Bliss

E. W. Bliss Company, 450 Amsterdam St., Detroit, presents a new line of single-crank **TOGGLE PRESSES** in eight sizes ranging from $4\frac{1}{4}$ to 7" shaft diameter and from $8\frac{1}{2}$ to $24\frac{1}{2}$" stroke length. They are used for deep drawing operations on steel, brass, copper, aluminum and other metals. The new designs feature steel-weldment construction, resulting in weight-savings and reduced floor space requirements. Operating speeds, stroke lengths and die-space dimensions remain the same as those for previous models, thereby permitting interchange of tools.



Assembling and servicing are facilitated by the new design and construction principles, according to Bliss engineers. The amount of bearing over-hang has been greatly reduced, and re-design of the toggle driving mechanism provides a cross head with long guides at the position where it is most needed. Steel rockshafts, yokes, and links are provided in the toggle-driven blankholder mechanism.

STANDARDIZATION Plus VERSATILITY

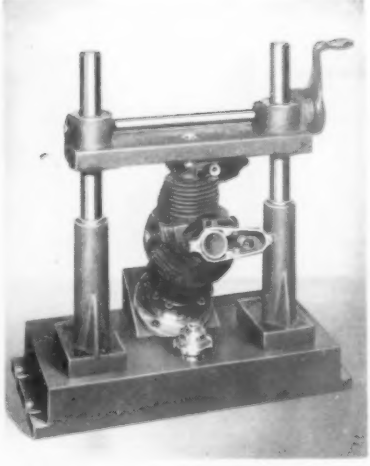
View showing Locating Horn and Interchangeable Adapters for Exhaust and intake chambers.

Designed and Built by "Q-C." Send us part prints for layouts showing suggested applications. This service is gratis.

As exemplified by this combination of "Q-C" Standardized Units.

When you incorporate "Q-C" Units in your designs, you can secure full advantages of standardization, without limitations. Only "Q-C" Method affords this important factor!

Send for your copy of the "Q-C" Tool Engineer's Reference and Standards Book.



Operation — Line Ream Valve Steam guide Bushings Exhaust and Intake. Part — Aircraft Cylinder. Machine — Radial Drill Press.

To Standardize Is to Economize

Q-C ENGINEERING PRODUCTS

2842 WEST GRAND BLVD. DETROIT 2, MICH.

Production Tooling Engineers Since 1926

6-TON thrust loads and 1-TON radial loads can't budge tools gripped in UNIVERSAL COLLET CHUCKS

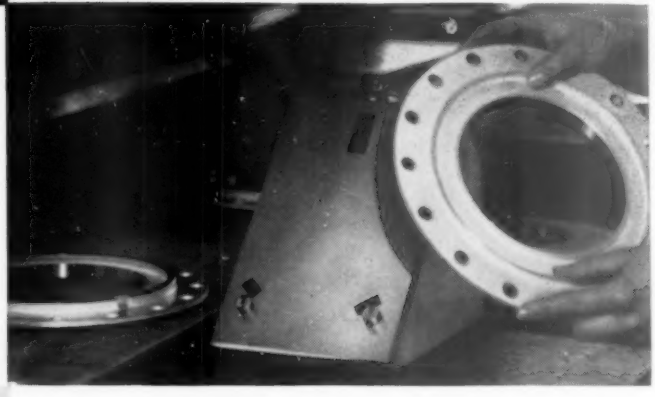
Universal Collet Chucks grip tools TIGHT! They hold end mills, taps, drills, and reamers positively rigid under 6-TON THRUST LOADS and 1-TON RADIAL LOADS. Special design produces *precisely equalized gripping power*—not at just a few points, but ON A CONTINUOUS SURFACE. That means you can use heavier feeds and greater speeds in your machining operations when you use Universal Collet Chucks—*you can turn out more work in less time.* Universal Collet Chucks grip tool flutes, permit stubbing, which eliminates cutting drills, thereby increasing profits. The Universal Collet Chuck is tightened so easily that LOCKING EFFORT IS REDUCED 50%. For faster, more accurate milling, drilling, reaming, and tapping in your plant, it will profit you to use Universal Collet Chucks. *Write for complete information.*

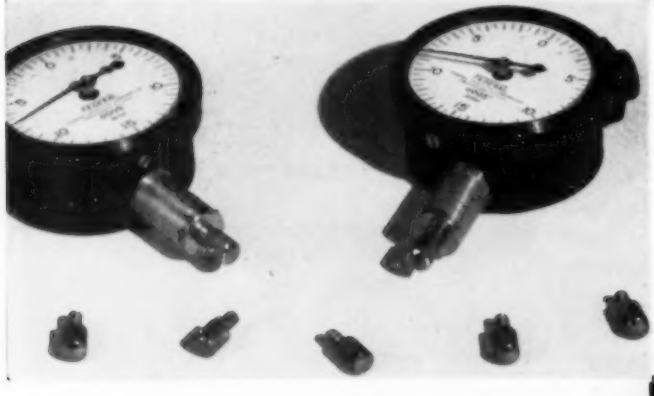
UNIVERSAL ENGINEERING COMPANY • **FRANKENMUTH, MICHIGAN**

If there is a Wear Surface on a Gage...
Wear-resistant **NORBIDE** *parts save Time and Money*

NORBIDE Gages are made of Norton Boron Carbide — the hardest material commercially produced—and it is this hardness which gives them their wear resistance. A NORBIDE plug gage measuring aircraft engine parts lasted 17 months where tungsten carbide lasted 14 days, chrome plated gage eight hours, tool steel gage four hours.

A new application of NORBIDE pieces is shown at the right where three rectangular NORBIDE inserts were used on an angle face plate. On last report this gage had been in service for six months of checking for truth or run out as well as diameters of aircraft engine flanges. The hardened steel plate formerly used required resurfacing every 24 hours.

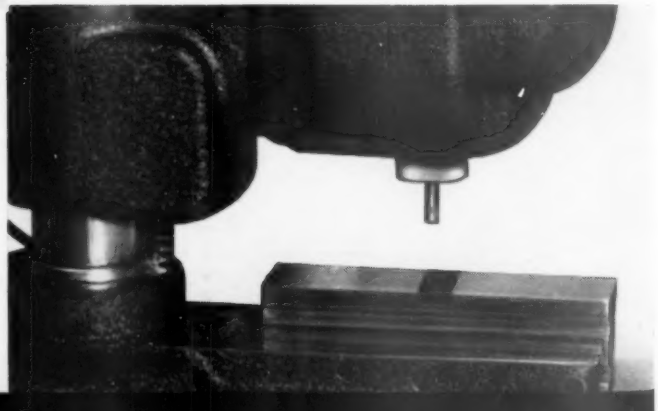




Contact points for dial indicator gages is a common use for NORBIDE shapes. NORBIDE gages will not pick up lint nor become charged with particles of metal. They are inert to chemicals ordinarily employed where gages are used. Because NORBIDE pieces weigh even less than aluminum, NORBIDE gages that are held in the hand cause much less fatigue.

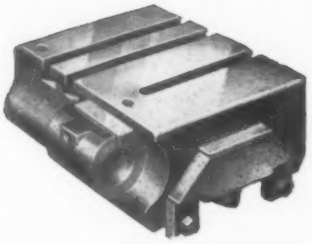
NORBIDE inserts are successfully used in the anvils of many gages. Because of their great wear resistance these anvils do not have to be constantly resurfaced, wear tolerances are eliminated and rejects are cut to a minimum. Ask your regular supplier about NORBIDE Gages or write to:

NORTON COMPANY, Worcester 6, Mass.



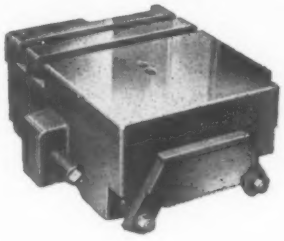
NORBIDE – The Hardest Material Made by Man

T. M. REG. U.S. PAT. OFF.

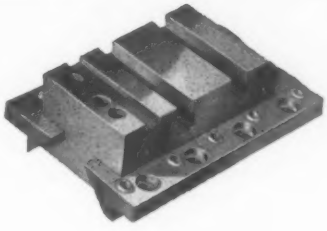


ALL SIZE MULTIPLE SPINDLE
F OR G GRIDLEY

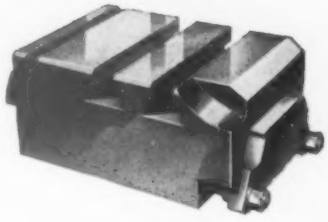
TAKES CUTS AT SPEEDS *Never Thought Possible!*



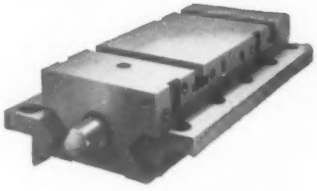
ALL SIZE SINGLE SPINDLE
GRIDLEY



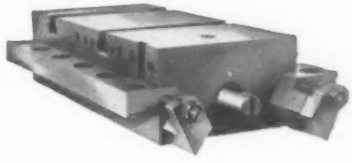
CUT-OFF SLIDE FOR 9/16",
3/4", OR 7/8" F OR G GRIDLEY



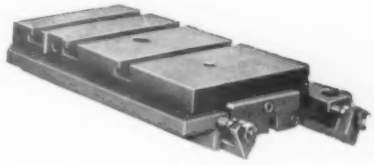
CUT-OFF SLIDE FOR 1-1/4" TO
2-5/8" F OR G GRIDLEY



1ST AND 5TH POSITION 9/16"
C ACME



1ST AND 5TH POSITION 1"
AND 1-5/8" C ACME



1ST AND 6TH POSITION R, R-A,
R-A-S ACME-GRIDLEY; ALSO 4-H
AND G-A GRIDLEY

Due to heavier construction, Slitters Slides are guaranteed to form or cut off any work which is within the machine's capacity. Their three and one-half times greater bearing surface, combined with their heavier construction, eliminates all rocking and swaying regardless of the amount of the cut taken. This feature makes Slitters Slides particularly important for close tolerance work; or large jobs can be done faster, with fewer operations, and longer tool life.

Adjusting gibs and moving parts of all slides for F or G Gridleys and Single Spindle Gridley, except the 9/16, 3/4 and 7/8" cut-off slide, are made of hardened and ground alloy steel working on scraped surfaces of nickel iron. The 9/16, 3/4 and 7/8" cut-off slide for F or G Gridleys, forming and cut-off slides for "C" Acme, "R", "R-A", "R-A-S" Acme-Gridley, also "4-H" and "G-A" Gridley are hardened throughout guaranteeing accuracy and longer tool life. Easily made adjustments will positively remain locked in position due to adjusting tapered gibs running the full length of the slide.

Try these slides. Convince yourself of the many features which make them the best slides you ever used.

SCREW MACHINE TOOL COMPANY

17565 Swift Avenue **Detroit 3, Mich.**

NOW—you can do...

SMALL PRECISION DRILL JOBS
FASTER, EASIER, BETTER WITH A

SIEWEK
Midget Type
SPRING JIG
NO. 1500

Distributors in Principal Cities

New "Nest" Service

We now offer a "Build" service for producing the nests to hold parts in Siewek Jigs for the drilling operation. Customers not equipped to design and build suitable "nests" will find this service economical. A sketch of the proposed nest is submitted with quotation.

Also manufacturers of widely used

SIEWEK CLAMPS AND FITTINGS

Full size Template Tracing sheets on request FREE.

Here is just the tool for fast precision work on small parts. The Siewek Standard Midget Type Spring Jig is positive and powerful. Tension is quickly adjusted. Interchangeable top plate permits new operation at a fraction of cost of extra jig and saves much time. Get description and dimensional drawing.

New Low Price
$35.00 NET
F.O.B. Ferndale, Mich.

Write for complete description and dimensional drawings.

SIEWEK TOOL COMPANY

2862 EAST GRAND BOULEVARD **DETROIT 2, MICHIGAN**

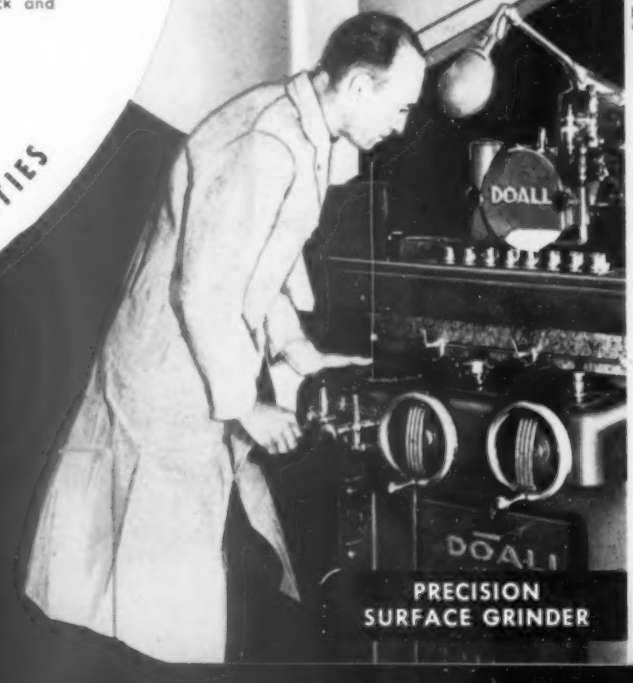
DoALL

REG. U. S. PAT. OFF.

Faster Machining

CONTOUR SAWING MACHINE

TOOLMAKERS' LATHE



PRECISION SURFACE GRINDER

ONE SOURCE SAVES YOU TIME AND EFFORT

DoALL Products

Include:

- **CONTOUR SAWS:** 13 models; all prices. Low and high speeds, step or variable. Precision or high-speed cutting.
- **BAND SAW BLADES:** Razor-sharp, superhard teeth. No resharpening needed.
- **BAND FILING MACHINES:** 9 times faster than hand filing, 4 times faster than jig filing.
- **JIG FILING MACHINES:** For more intricate work. Perfectly straight filing.
- **FILES:** All kinds — file bands, jig files, rotary files, hand files.
- **SURFACE GRINDERS:** 6 models. Hydraulic, precision type for toolrooms and production. Also grinding wheels, magnetic chucks, cutting oils, coolant systems, dust collectors, etc.
- **SPOT WELDERS:** New "True-Pressure" type having straight up-and-down movement. No tip skidding.
- **HEAT-TREATING UNITS:** Compact, combination unit includes furnace, oven, quench tanks, automatic controls.
- **ELECTRONIC INSPECTION:** Automatic inspection, sorting and counting of small parts, twice as fast as manual methods.
- **BENCH PROFILERS:** For great variety of small work—profiling, milling, slotting, routing, etc.
- **PRECISION LATHES AND HAND SCREW MACHINES:** Various types for toolroom and production lines.
- **RADIUS SHAPER-MILLER:** 1 setup for many operations—has a thousand production uses.
- **VARIABLE SPEED DRIVES:** Smooth speed-changing drives. Infinitely variable.
- **GAGE BLOCKS AND INSPECTION INSTRUMENTS:** The finest for precision work.
- **TOOL-AND-DIE STEEL:** Non-warping, precision-ground up to 1 inch thick and 6 inches wide.

The DoALL Company

Reg. U. S. Pat. Off.

REPRESENTATIVES IN 56 COUNTRIES

Cable Address: DoALL, Des Plaines

Des Plaines, Illinois

DoALL SALES AND SERVICE STORES IN KEY CITIES

Send for free pictorial booklet "DoALL EQUALS TEN PLUS" which compares fast, efficient Contour Machining with other metal-cutting processes. Shows how this miracle method of low-cost production makes great economies.

IMPROVE CUTTING *Efficiency* BY USING CARBIDE-TIPPED TOOLS *with* HIGH-SPEED STEEL BODIES

Taper Shank Chamfering Cutter with Carbide Tips.

Subland Reamer and Form Relieved Counterbore with Carbide Tips.

Straight Shank Form Relieved Cutter with Carbide Tips.

The perfection of Carbide-Tipped Tools Brazed on Hardened High-Speed Steel Bodies marks an epoch in the creation of tools of higher cutting efficiency. Here are the reasons:

The high-speed steel body naturally provides a much harder base for the carbide tips, thereby greatly reducing "spring-back" under heavy cuts.

Then too, the flutes and pilots, because they Rockwell C-62-63 throughout their entire length, do not score or pick-up, the pilot giving much longer wear.

The result is that Carbide-Tipped Cutting Tools with HIGH-SPEED STEEL BODIES give you smoother operation, longer tool life and reduced production costs. You get not only top-quality tools but also top-quality work.

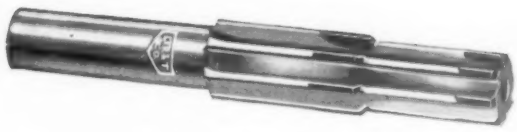
Our engineers will be glad to work with you on your problems.

• **MADE TO YOUR SPECIFICATIONS** •

DETROIT REAMER & TOOL CO.

2830 E. Seven Mile Road **Detroit 12, Michigan**

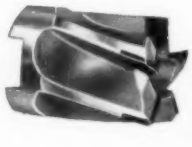
Manufacturers of Oil-Hole Drills, Subland Drills, Special Reamers, Circularity Relieved Reamers, End Mills and Special Tools



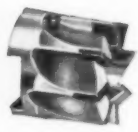
Step Reamer with Carbide Tips.

Write for QUOTATION

SUBLAND REAMERS
•
LINE REAMERS
•
CENTER DRILLS
•
COUNTERBORES
•
CORE DRILLS
•
END MILLS
•
Special Tools To Your Specifications

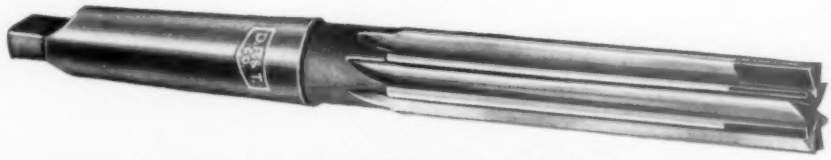


Spiral Shell End Mill with Carbide Tips.



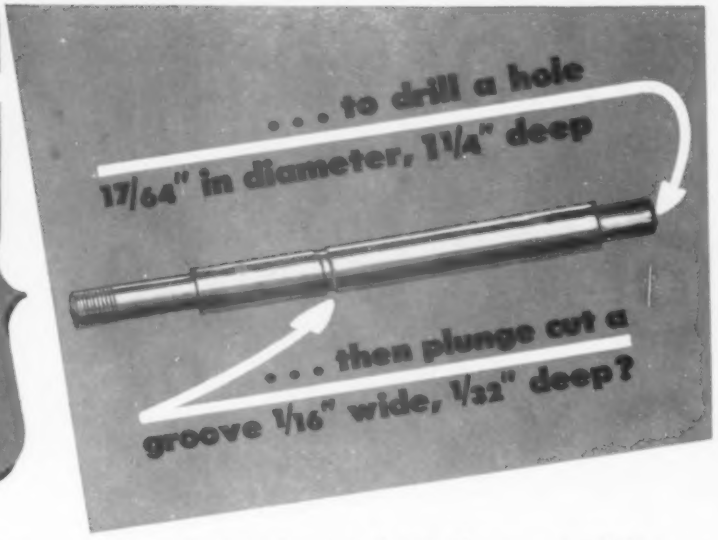
Straight Flute Shell End Mill with Carbide Tips.

Taper Shank Core Drill with Carbide Tips.



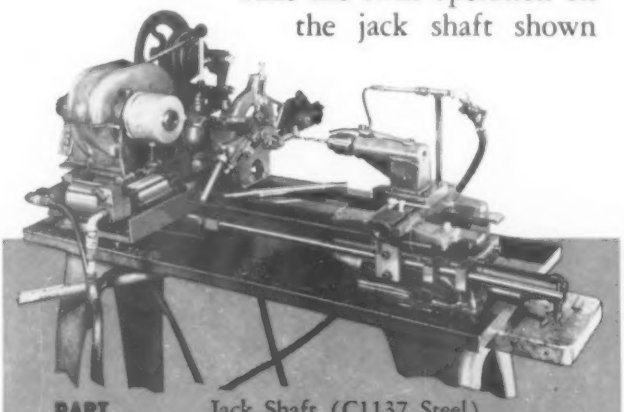
Taper Shank Straight Flute Reamer with Carbide Tips.

HOW LONG should it take



Critical analysis of repetitive operations, plus a little ingenuity, goes a long way towards helping maintain profits fast being eliminated by rising wage and material costs.

Take the twin operation on the jack shaft shown above. By hand, with the lead screw working the turret, one operator produced approximately 80 pieces per hour, 600 per shift.



PART	Jack Shaft (C1137 Steel).
OPERATION	Drill 17/64" dia. hole 1¼" deep, plunge cut groove 1/16" wide x 1/32" deep.
MACHINE	Atlas Lathe, 42" size, Model TH-42, ½ h.p. motor, equipped with Bellows BCAM-5-90 Air Motor to feed the turret, and BCAM-5-25 Air Motor to feed the cross slide. Both Air Motors are equipped with CC-40 Hydro-Checks. One No. 645-2 Lubro Unit is used for the two motors.
FEED	.007"—.010" per revolution.
SPINDLE SPEED	650 R.P.M.
TOLERANCES	.002" on both operations.
COOLANT	Sunicut No. 105.
PRODUCTION	Former method—one operator produced 80 parts per hour working one machine. Now handles two machines, produces 200 parts per hour. 33% longer tool life.

At the suggestion of a Bellows Field Engineer, production experts at the Kooima Machine Works equipped the lathe with a Bellows Air Motor to feed the turret, and a second Bellows Air Motor to feed the cross slide. The thrust of both Air Motors is controlled by Bellows Hydro-Checks.

One operator now handles two machines with less physical effort than he formerly spent on one. The operator merely pivots from one machine to the other to load and unload the work piece. Manufacturing operations are entirely automatic.

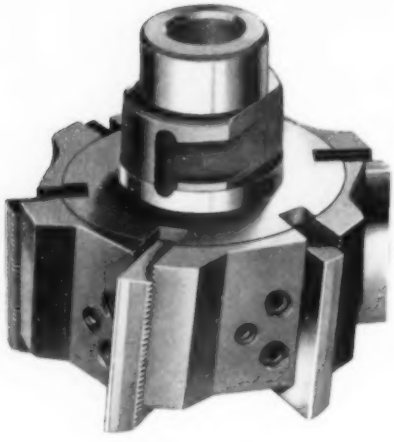
Production: 200 per hour, 1600 per shift. An increase of 250%.

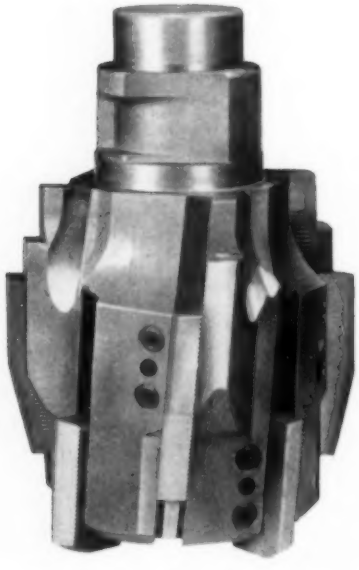
The use of Bellows "Controlled-Air" Power to replace repetitive manual feeding, clamping and holding operations is today's quickest answer to lower unit costs. These versatile, inexpensive power units can be quickly applied to most standard or special machine tools. They usually pay for themselves with the first week's increased output.

Write today for Bulletin CL-10 and the new Foto Facts File

The Bellows Co.
ESTABLISHED 1911
Akron, Ohio

INSERTED BLADE CUTTERS

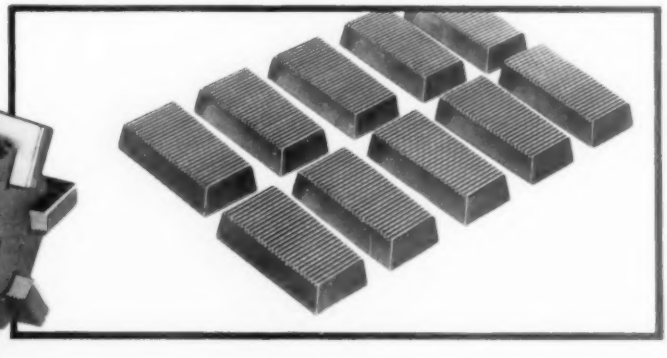




....With Traditional Eclipse Top Quality, Longest Life!

● Quality and long life are two key factors in selecting inserted blade locking constructions. That's why you should consider Eclipse adaptations . . . "tailor-made" for your particular problem.

● One important feature should be remembered: all Eclipse designed inserted blade cutters provide for both lengthening and expanding blades. Eclipse engineers will gladly recommend desirable features for your particular operation—write today.



ECLIPSE COUNTERBORE CO.

Founded thirty years ago

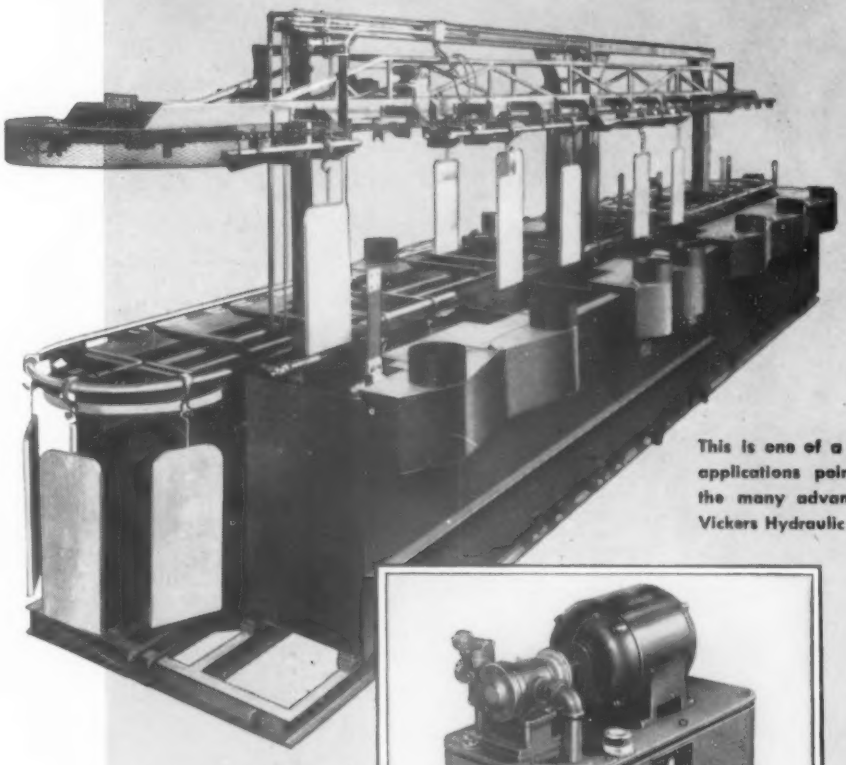
DETROIT 20, MICHIGAN

VICKERS helps achieve

HYDRAULIC EQUIPMENT

HIGH PRODUCTION
SPACE ECONOMY
UNIFORM QUALITY

IN *Udylite* AUTOMATIC PLATING MACHINE



This is one of a series of applications pointing out the many advantages of Vickers Hydraulic Controls.

Above: Elevated position for transfer from one tank to the next.

Vickers Hydraulic Power Unit.

This Udylite machine does a complete plating job automatically . . . taking each part through seven tanks and a drying chamber . . . timing exactly the interval in the various solutions for cleaning, plating and rinsing.

Each part (or rack of parts) is automatically lowered into each of the seven tanks in turn—then lifted out and transferred to the next tank. This might be done with a multiple dip conveyor. But the conveyor slants permissible in lowering and raising in that way require extra tank length.

Udylite made the machine far more compact—saving 18″ to 24″ in the length of each tank—by using Vickers Hydraulic Equipment to raise and lower the entire conveyor assembly at each transfer. By this means, each piece (or rack) is lifted straight out of the tank, moved over the next tank and lowered straight down. This provides better cleaning and more uniform plating—better drainage and less contamination of the solutions.

The Vickers Hydraulic Power Unit and Control Valves have many advantages for such applications: (1) proven dependability, (2) accurate control and precise timing, (3) flexibility of control to suit varied production requirements, etc.

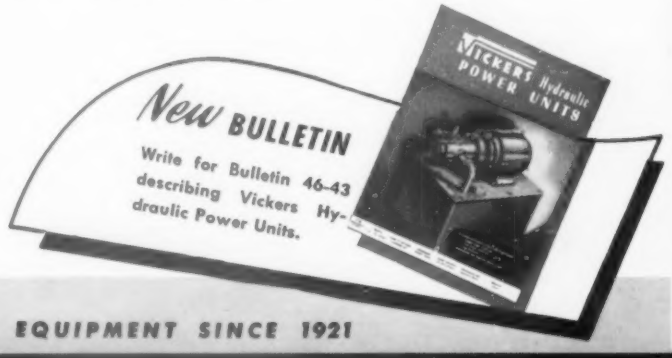
The versatile features of Vickers Hydraulic Equipment on this type of application, as on many other industrial installations, have made possible increased production, improved product quality, greater safety, and lessened physical demands upon labor while increasing its productivity. Vickers Application Engineers will gladly discuss your individual control problems.

VICKERS Incorporated

Subsidiary of the Sperry Corporation

1416 OAKMAN BLVD. • DETROIT 32, MICHIGAN

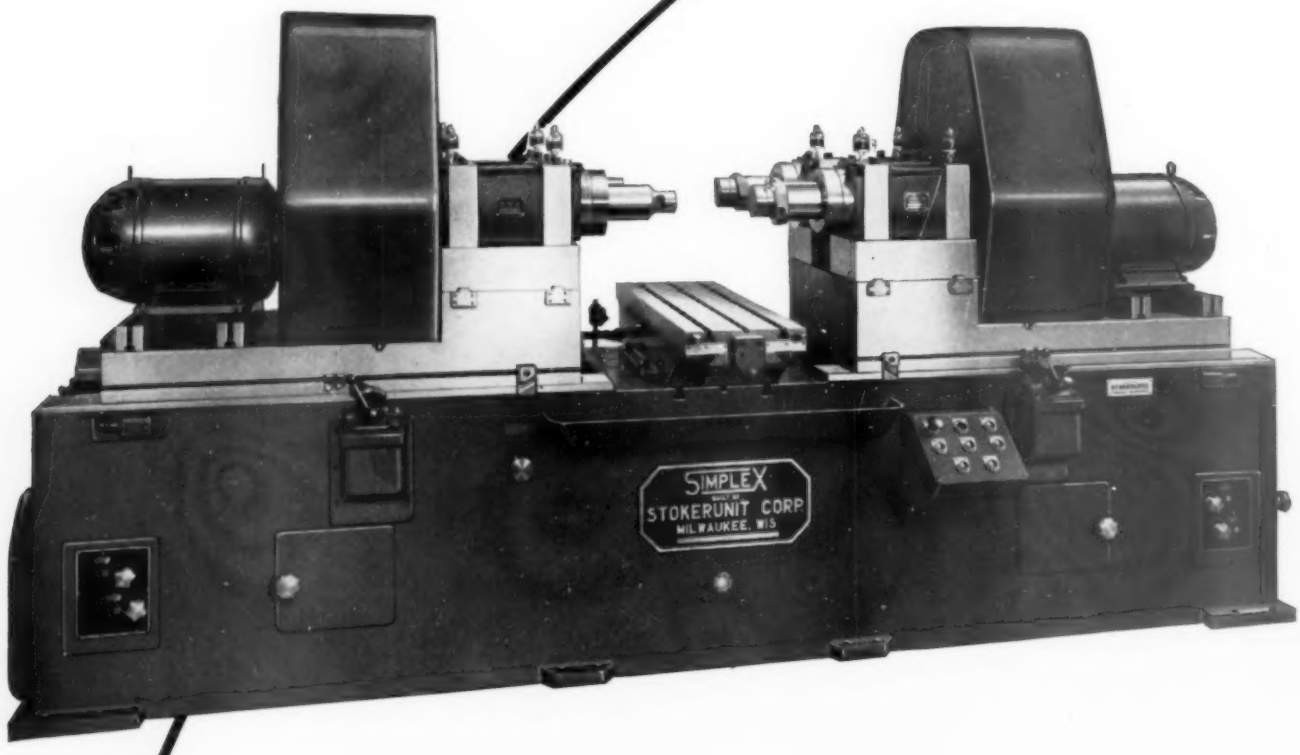
Application Engineering Offices: ATLANTA • CHICAGO • CINCINNATI CLEVELAND • DETROIT • LOS ANGELES • NEWARK • PHILADELPHIA ROCHESTER • ROCKFORD • SEATTLE • TULSA • WORCESTER



ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

SIMPLEX

Increasing wage rates of today make necessary new methods of reducing costs. At medium production rates, this becomes difficult with general purpose machine tools. Simple multiple tooling and fixtures, indexing from roughing to finishing position, offer a new cost reduction method. Tooling costs are low — job possibilities endless.



This photograph shows a SIMPLEX 4U 2-way Precision Boring Machine equipped with four #4 spindles and a hydraulically indexed sliding table operating between adjustable positive stops. On the sliding base a single work holding fixture is mounted providing for operating on the work from both ends. After the roughing operation is completed on both ends, the table is indexed to the finishing position, the finishing operations are performed on both ends simultaneously and the completed job is ready to remove from the fixture to change to the next job. The fixture and tools are removed and retained intact, ready for a quick set-up when the job is again run. The automatic cycle relieves the operator and helps maintain predetermined production schedules.

Precision Boring Machines

STOKERUNIT CORPORATION

SIMPLEX Machine Tools Division

4528 West Mitchell Street, Milwaukee 14, Wisconsin

Precision Boring Machines, Planer Type Milling Machines and Special Machine Tools

HOW TO SQUARE A CIRCLE

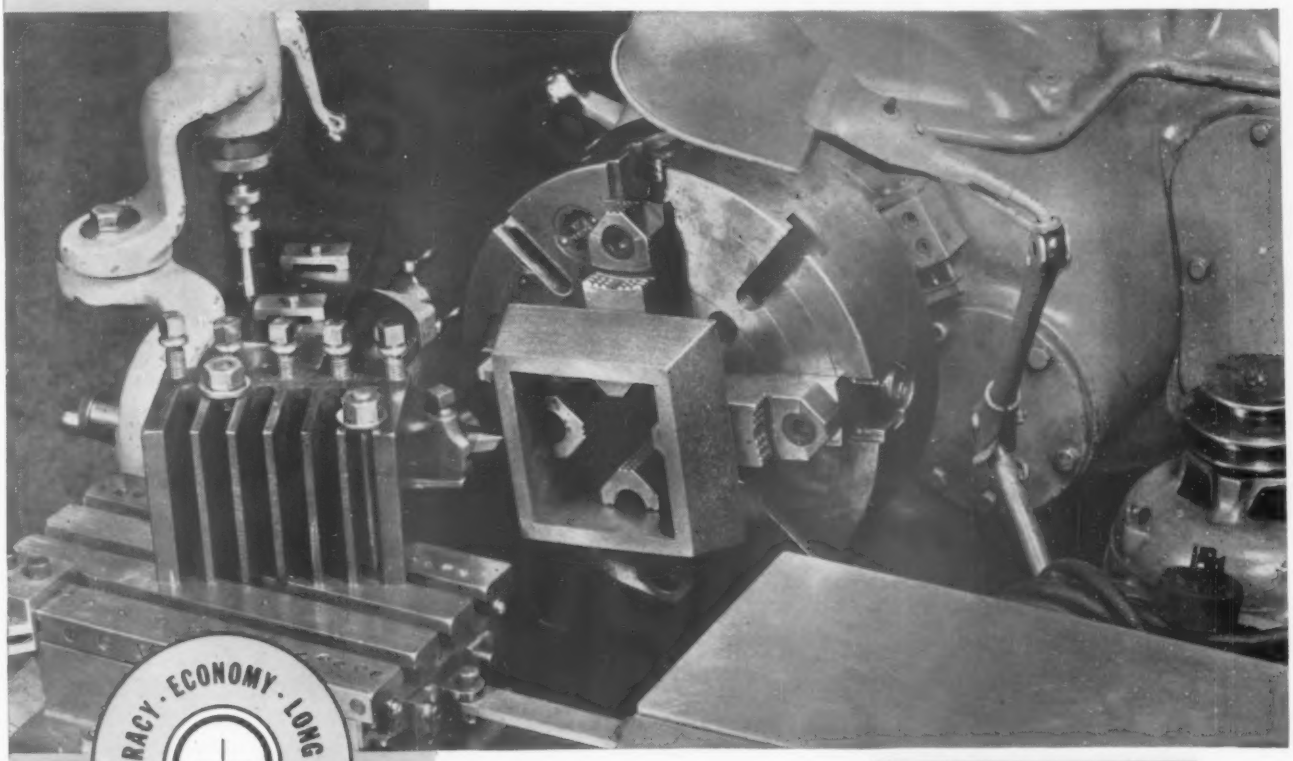
with Monarch's Shapemaster Lathe

That's right—we're actually *turning* a square—on a lathe!

But that's not all—we've bored the square, too, on a taper—and a square is only *one* of an almost infinite variety of shapes we can turn; ovals, stars, triangles, flutes (even up to *500 of 'em*, flat, convex or concave). We can blend from a round to an oval or a hexagon or a square or any other shape. In addition, we can produce sharp, clean-cut corners in recessed or exterior angles. Fact is, we can turn or bore almost any conceivable contour that allows room for a tool point.

You can do it, too. All you need is the famous Monarch Shapemaster Lathe. Think what that means—intricate, costly dies *turned* on a machine, to exacting tolerances—in a fraction of the time required for handwork—and at a fraction of the cost!

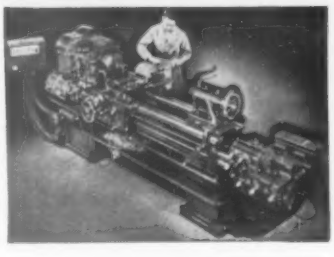
If you're doing die work—or any contour turning in metal—you owe it to yourself to investigate the Shapemaster. Like more facts? We'll be glad to oblige. Just write to The Monarch Machine Tool Company, Sidney, Ohio.



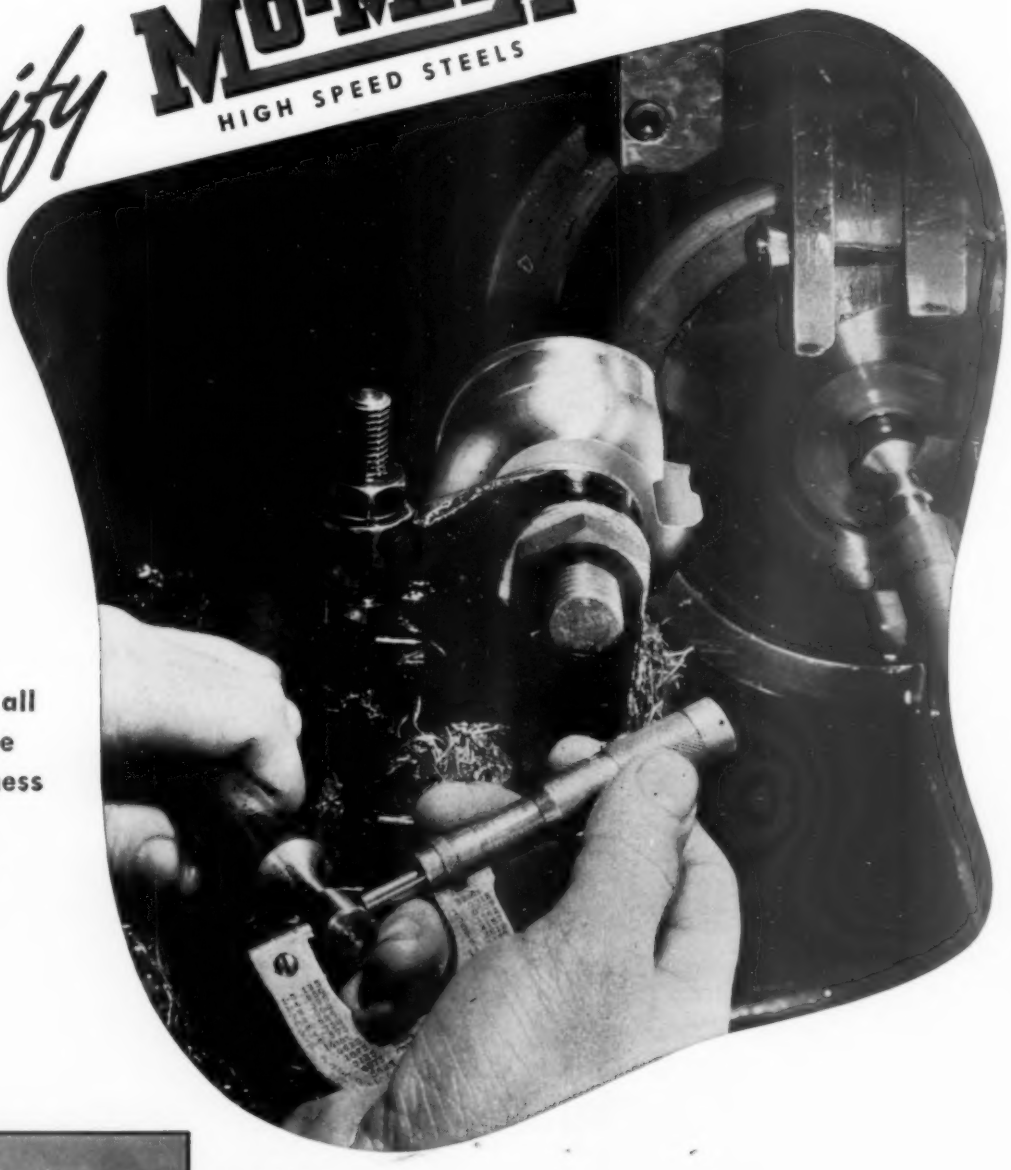
ACCURACY · ECONOMY · LONG LIFE

Monarch TURNING MACHINES

For complete factual and pictorial information on how the famous Monarch Shapemaster can save you time and money in the precision production (or reproduction) of dies, write for your copy of Bulletin 2501.



Specify MO-MAX HIGH SPEED STEELS



In circular and flat forming tools, as in all other cutting tools, the toughness and hardness of MO-MAX assure better performance.

Buyer's Guide to Brands of MO-MAX

"LMW"	Allegheny Ludlum Steel Corporation
"MOHICAN"	Atlas Steels Limited
"BETHLEHEM HM"	Bethlehem Steel Company
"MO-CUT"	Braeburn Alloy Steel Corporation
"STAR MAX"	Carpenter Steel Company
"MOLITE M-1"	Columbia Tool Steel Company
"REX T-MO"	Crucible Steel Company of America
"DI-MOL"	Henry Disston & Sons, Inc.
"HI-MO"	Firth-Sterling Steel Company
"REX T-MO"	Halcomb Steel Company
"MOGUL"	Jessop Steel Company
"TATMO"	Latrobe Electric Steel Company
"MIDMAX"	The Midvale Company
"S. T. M."	Simonds Saw & Steel Company
"MO-TUNG"	Universal-Cyclops Steel Corporation
"8-N-2"	Vanadium-Alloys Steel Company
"VUL-MO"	Vulcan Crucible Steel Company

Only MO-MAX GIVES YOU *ALL* THESE ADVANTAGES

1. MO-MAX has superior cutting qualities.
2. The machinability of MO-MAX is unexcelled.
3. MO-MAX is economical. Its specific gravity is about 8% less than that of 18% tungsten steel.
4. MO-MAX is available in a standardized composition; also in cobalt and high vanadium varieties for special high speed steel requirements.
5. For 14 years MO-MAX has demonstrated its superiority in all types of cutting tools.

Learn all the facts! **Send for your copy of the MO-MAX Handbook, sixth edition. Get the full story about this remarkable steel, including easy-to-follow instructions on heat treating.**

THE CLEVELAND TWIST DRILL COMPANY

1248 East 49th Street • Cleveland 14, Ohio

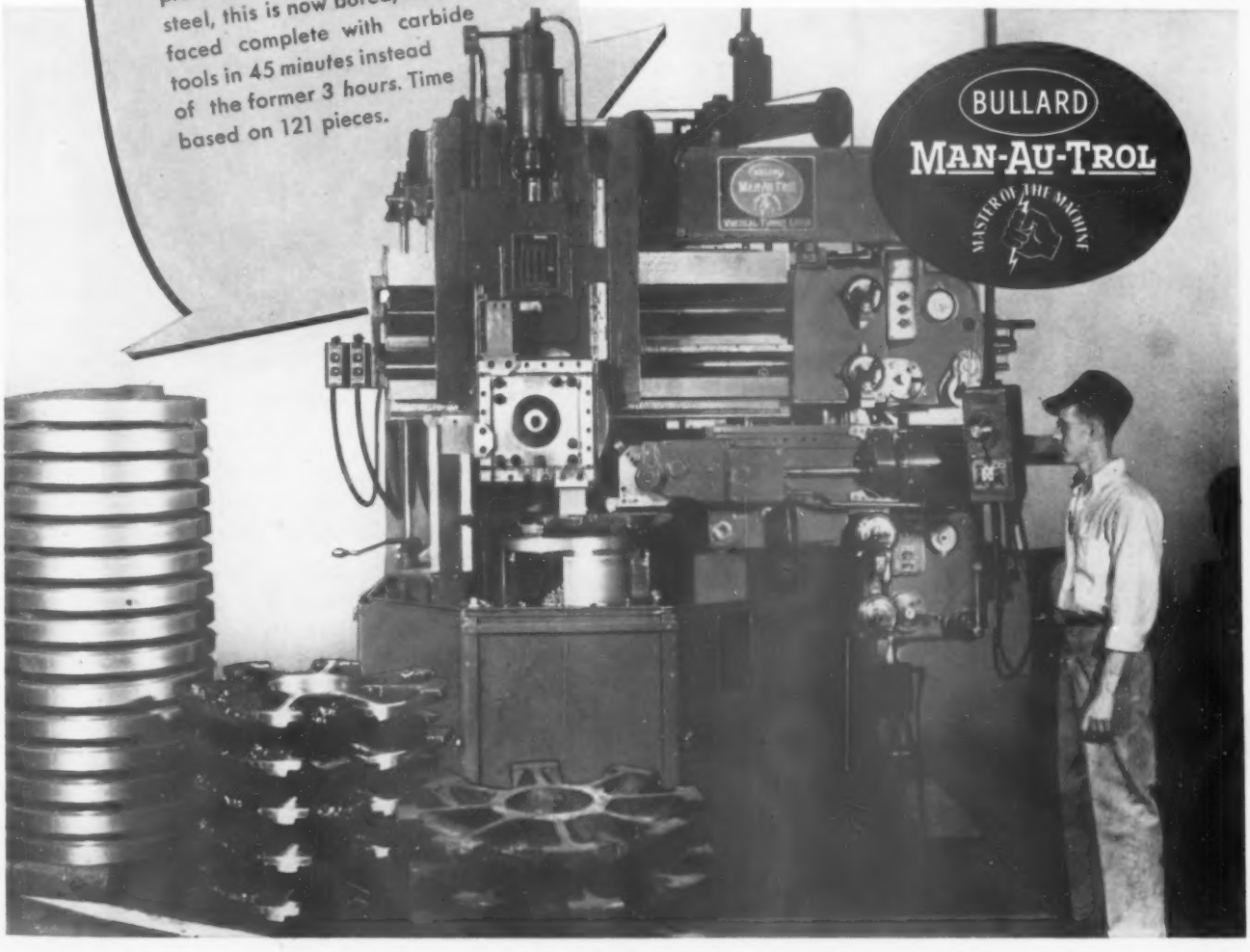
America's largest manufacturer of tire and tube curing presses reports:

Crank Gear Blanks Machined 12 Times Faster on a BULLARD Man-Au-Trol V. T. L.

BULLARD 36" Man-Au-Trol Vertical Turret Lathe is setting new production records for The McNeill Machine & Engineering Co., Akron 11, Ohio. For example: a crank gear blank of welded steel — O. D. 27.166" — which formerly took 4 3/4 hours, is now bored, finished and faced complete in 22 minutes in one setup except for the crank pin bore. Another with 28.500" O. D. is done in 27 minutes. All fractional dimensions held to 1/64" . . . all decimal dimensions to .005". Time based on 500 pieces, produced two months ahead of schedule.

Another job (illustrated here) is steam platen support for tire and platen presses: made of 1045 cast steel, this is now bored, turned and faced complete with carbide tools in 45 minutes instead of the former 3 hours. Time based on 121 pieces.

Investigate how the unique productivity, versatility and accuracy of **BULLARD** Man-Au-Trol Vertical Turret Lathes can give *you* substantial cost advantages in competitive markets. Write for Bulletin MAV-G-1 today. THE BULLARD COMPANY, Bridgeport 2, Connecticut.



BULLARD CREATES *NEW METHODS* TO MAKE MACHINES DO MORE

Finer Finishes at Roughing Speeds to *Meet Tomorrow's Competition . . . .*

LIPE *Carbo-Matic* LATHES

- **FEWER MAN HOURS** because it is entirely automatic.
- **FEWER MACHINE HOURS** because it is super-powered for speed.
- **FEWER REJECTS** because it is super-rigid for accuracy.

Finer and finer finishes at faster and faster speeds! Speed that is not lost through time lags in loading, unloading and operating—or through high scrap losses and rejects!

Those are competitive factors you'll have to reckon with tomorrow. And worn-out or over-age lathes won't face up to them. They'll cost you more in lost production, spoilage of product and poor workmanship than new Lipe Carbo-Matic Lathes will cost you.

The Lipe Carbo-atic was designed and built for carbide tools and for tight limits of finish and accuracy at roughing speeds. Super fast, rigid as a rock, its Cone worm gear and multiple V-belt drive gives a smooth chatterless cut, hogging off metal to rough-grinding tolerances on the first pass. Fully automatic, even on complex cycles, it permits battery operation and reduces loading and unloading time to a minimum. A heavier base, over-size motor, accessible controls and other modern features make it the tool of tomorrow.

NOW AVAILABLE for IMMEDIATE DELIVERY

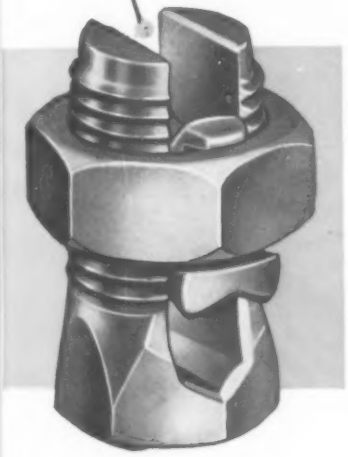
LIPE ROLLWAY

LIPE-ROLLWAY CORPORATION

Syracuse 5, N. Y.

CARBIDE TIPPED CUTTERS

PRODUCE 40 TIMES AS MANY PIECES PER GRIND AT RELIABLE ELECTRIC CO.



Another sound application for carbide and another fine example of how Illinois Tool engineers, through their long experience with tools and tool materials of all types, can help you achieve peak production efficiency.

Solving vital tooling problems like this is typical of the engineering cooperation and service that Illinois Tool offers you. Whatever your problem may be . . . carbide, high speed steel, or cast alloy tooling . . . Illinois Tool places at your disposal impartial judgment combined with the skill, talents and facilities acquired in 34 years as headquarters for engineered cutting tools.

THE PROBLEM:

Engineers of Reliable Electric Company, Chicago, desired to increase the efficiency of slotting leaded bronze split bolt connectors. High speed steel milling cutters already gave 30 hours service per grind and tool life had to be increased even more.

RECOMMENDATION:

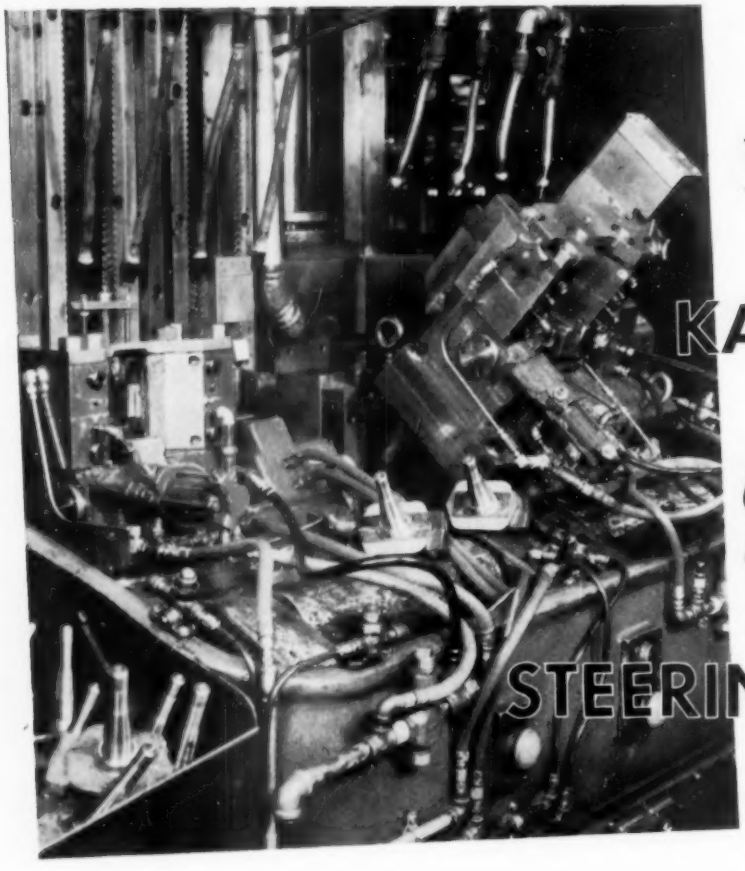
Special carbide tipped milling cutters designed through the cooperation of Illinois Tool Works and Reliable Electric engineers.

RESULT:

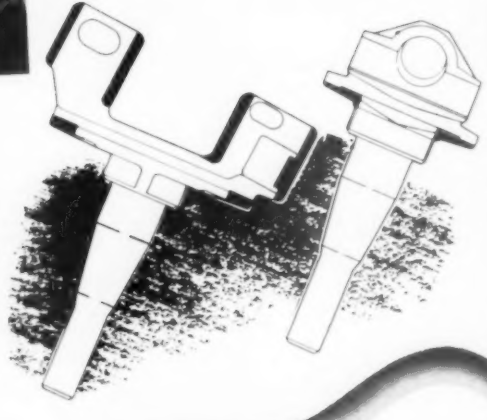
Carbide tipped cutters gave 1200 hours of service before grinding was necessary and efficiency climbed to 85%.

ILLINOIS TOOL WORKS

2501 North Keeler Ave. • Chicago 39, Ill.



MICHIGAN TOOLED KAISER-FRAZER FOR *Complete Broaching* OF THIS STEERING KNUCKLE



Broaches, Broach Holders and Pneumatic Fixtures were designed, built and followed in Production by Michigan

Illustrated is one of 4 machines equipped by Michigan. Shows dual ram set up with pneumatic fixture at left in operative position, fixture at right in loading position. 16 surfaces and the king pin hole are broached to final finish in five passes.

What makes this a story? Just that Michigan can do the same for you—start with the part print and machine and place the job in production.

Let Michigan quote on your next job

MICHIGAN WILL *also* DO THE COMPLETE MACHINING OF YOUR PARTS

Michigan is also equipped with the largest machine shop of its kind to machine and broach production parts for you.

MICHIGAN BROACH CO.

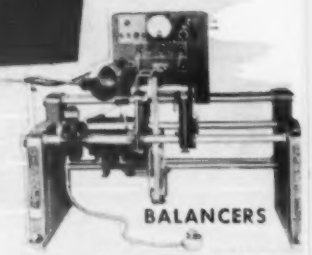
10373 NORTHLAWN AVENUE • • • DETROIT 4, MICHIGAN

Bring your Machining problems to the "Gisholt Round Table"

An organization learns a lot in 50 years of building and using machine tools. At Gisholt, this store of experience—symbolized by the Gisholt Round Table—represents thousands of problems successfully solved for thousands of users.

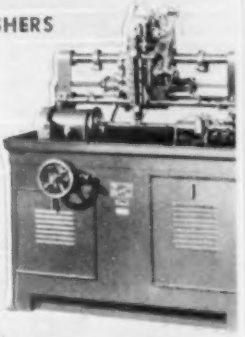
The answers to your problems, too, may be found at the "Round Table"—answers that will help you find better, more economical methods of machining round or semi-round parts.

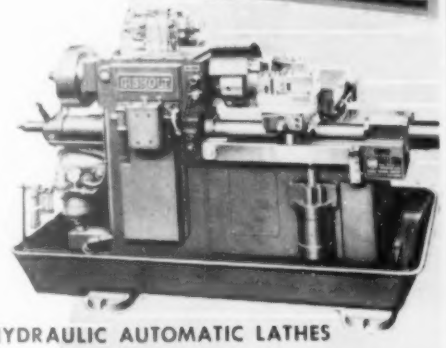
Whether your interests lie in small lots or large volume production—or in further refinements through balancing or Superfinishing—Gisholt's specialists in these fields are ready to collaborate with you—to give you their unbiased judgment on the methods and equipment best suited to your individual needs.



BALANCERS

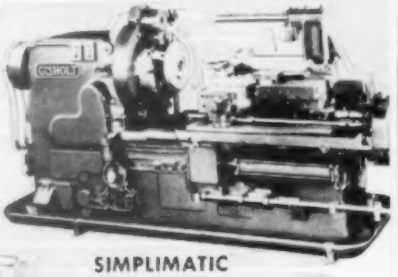
SUPERFINISHERS





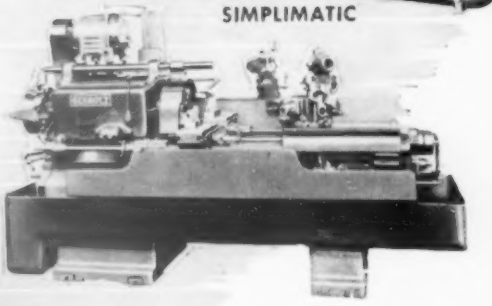
HYDRAULIC AUTOMATIC LATHES

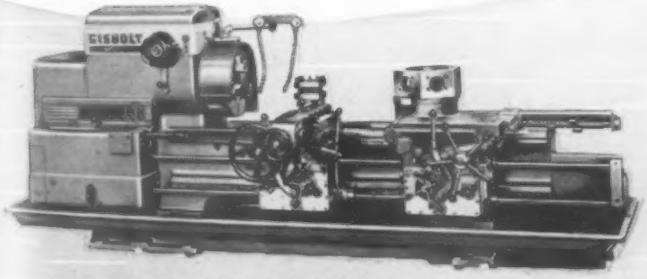
GISHOLT MACHINE COMPANY
Madison 3, Wisconsin



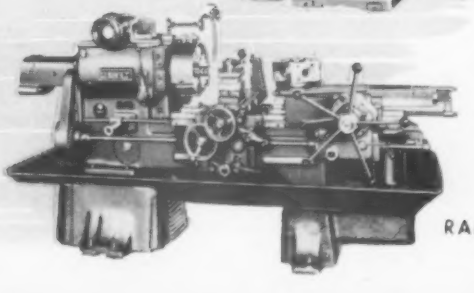
SIMPLIMATIC

FASTERMATIC





SADDLE TYPE TURRET LATHES



RAM TYPE TURRET LATHES

WHERE PRECISION IS MAXIMUM YET PRODUCTION IS MODERATE

Here's how it's done on a Heald No. 48-A Bore-Matic

The customer's production requirements on this refrigerator piston and connecting rod job were moderate. He wanted low-cost manufacture with maximum precision.

Heald engineers tooled up the No. 48-A Precision Bore-Matic shown below with two separate holding fixtures. One is for finish-boring the wrist pin holes in the pistons. And the other holds the connecting rods, in which the wrist pin hole is finished to a .0002" size tolerance and the crank bore to a .0005" tolerance.

Chances are, too, that the right Heald Bore-Matic can solve your precision finishing problems—on jobs involving boring, turning, facing, grooving, chamfering, and even forming—singly or in multiple machining operations.

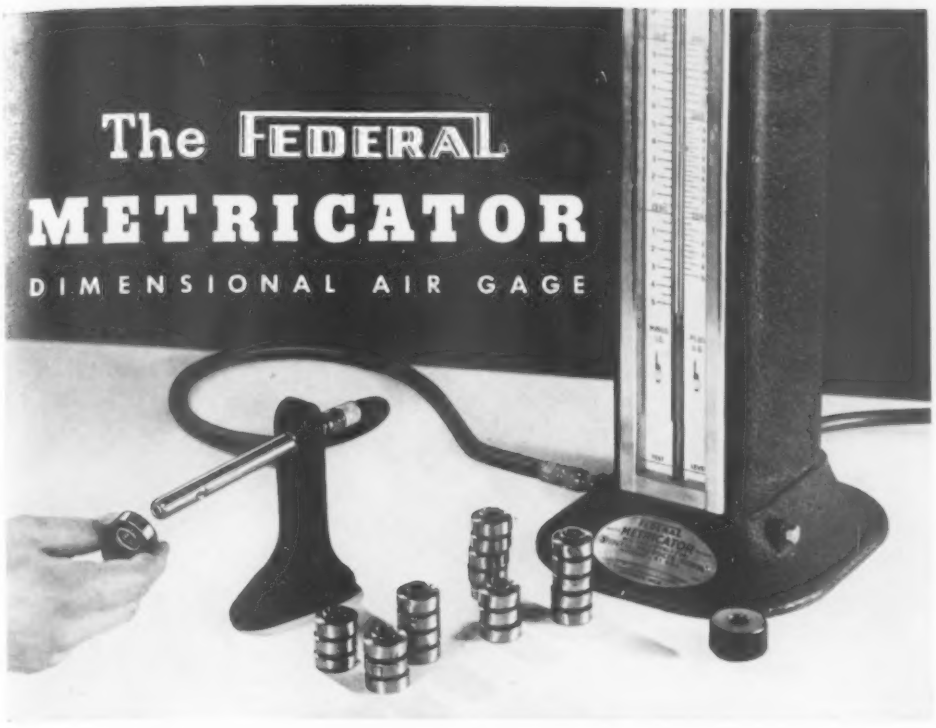
For that's our business—developing *basic machining methods* to a high degree of accuracy and finish, and at whatever rate of production you specify. Why not let us show you how our business can help yours? Write to: THE HEALD MACHINE COMPANY, Worcester 6, Mass.

HEALD

means more precision
. . . less cost

This connecting rod-holding fixture is easily substituted for the piston-holding fixture shown on the machine. Cross slide has aligning rails for locating fixtures positively without having to line them up each time they're changed.

INTERNAL AND SURFACE GRINDING MACHINES • BORE-MATIC PRECISION FINISHING MACHINES



Simplest to set up — simplest to operate — shows actual dimensional variations — not merely rejects

The simplest in design and construction

—that means positive accuracy, economy, foolproof operation

THIS dimensional air gage has only two operating units — the gaging head and the indicator column. No special skill is required in applying the gaging head to either inside or outside dimensions; it guides and locates itself. Dimensional variations as small as .000025" are amplified thousands of times so that they are easy to see on the numbered scale.

The Federal Metricator requires *no* pressure regulators, filters, constant pressure controls, drains, floats or other mechanical controls. Air is drawn from your own air supply or from an inexpensive 1/12 H.P. compressor. Ordinary tap water is used in the indicator column. Only *one* master is required for setting and checking the gage.

The complete simplicity of this precision instrument means foolproof operation, when the accuracy of workpiece dimensions is to be measured. It offers many other practical advantages . . .

By actually *measuring* dimensional variations — instead of merely *comparing* — you salvage a high percentage of your former rejects.

Several gaging heads of various sizes can be operated from the same indicator column. When interchanging heads of different sizes, no adjustments are required — and no change in the scale. Several different dimensions can be inspected *simultaneously* by the use of an indicating column equipped with multiple measuring scales.

The accuracy of the Federal Metricator is *not* dependent upon springs, sensitive calibrated tubes or precision glass tubes. Its positive, self-compensating pressure control cannot go wrong. The non-adjustable master jet maintains *fixed* gaging accuracy. Even dirt in the water — and dirt and moisture in the air line — have no effect on this accuracy.

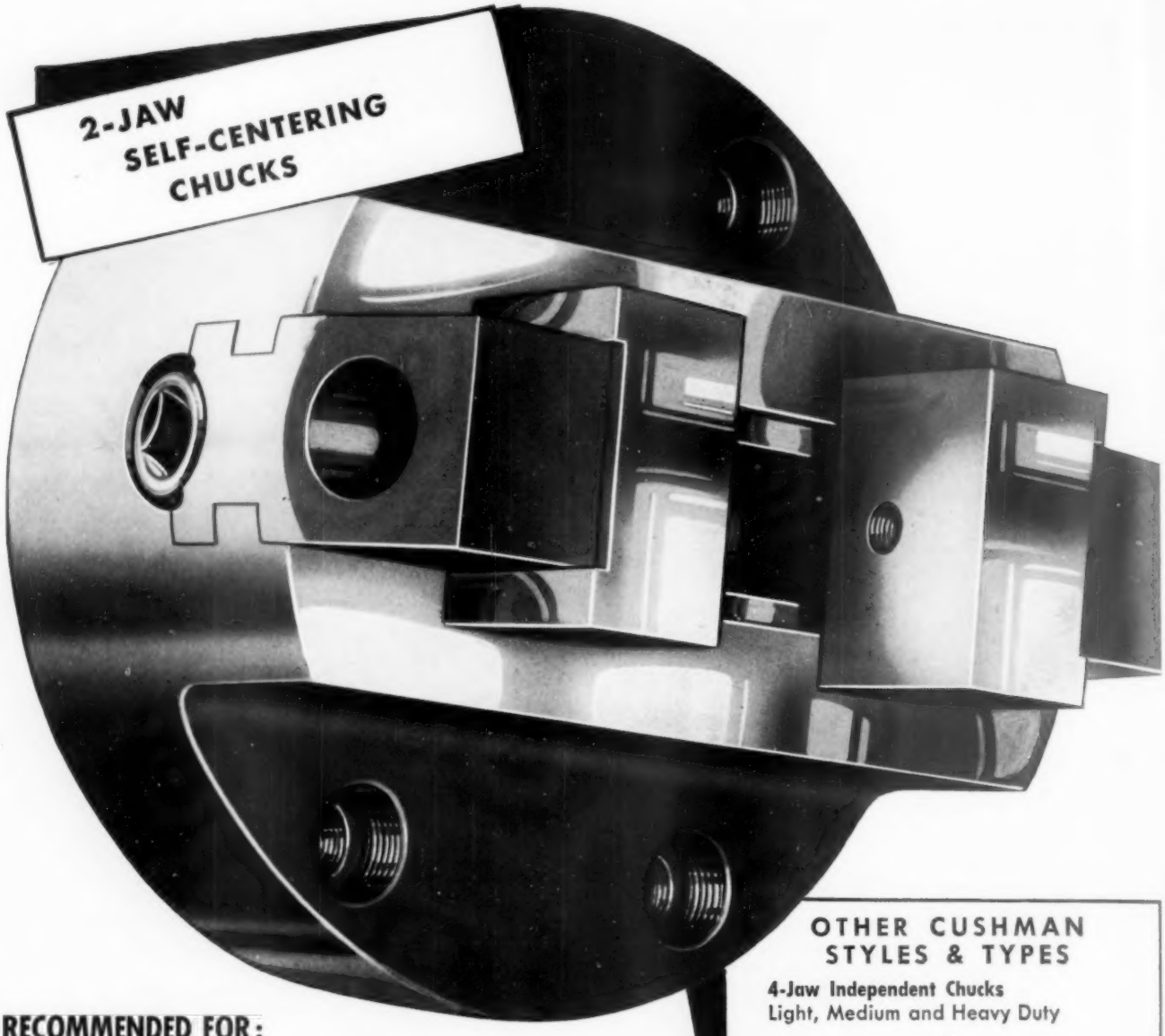
Because air requires no mechanical contacts and can be directed into places frequently inaccessible by mechanical gages — the Federal Metricator is both adaptable and efficient for gaging hard-to-get-at dimensions, soft materials and fine finishes.

In total life the cost of the gaging heads is much *less* than that of conventional plugs; a gaging head outwears the mechanical go, no-go plug hundreds of times.

The Federal Metricator furnishes a better way to gage many critical dimensions; it is well worth your careful consideration. Write for illustrated Bulletin No. 21 and a demonstration, if desired.

FEDERAL
PRODUCTS CORPORATION
1144 EDDY STREET • PROVIDENCE 1, R. I.

• Dimensional Dial Indicators and Indicating Gages — mechanical, electronic, air, multi-dimensional • Automatic Sorting • Dimensional Machine Control • Combinations of these methods. For the Mechanical, Textile, Rubber, Paper and all industries requiring dimensional accuracy.



RECOMMENDED FOR:

Turret lathes and automatic lathes, particularly where special work-holding jigs and fixtures are required. The body is designed so that attachment and alignment of such fixtures is easy and positive. Master jaws are most carefully fitted and accuracy in centering is an outstanding feature. Also the wide jaw opening permits the use of a dovetail adapter and dovetail jaws if desired. Bulletins on request.

OTHER CUSHMAN STYLES & TYPES

4-Jaw Independent Chucks
Light, Medium and Heavy Duty

•

3 and 4-Jaw Self-Centering Chucks
Light, Medium and Heavy Duty

•

3 and 4-Jaw Combination Chucks
Medium and Heavy Duty

2-Jaw Chucks
Medium and Heavy Duty

•

Collet Chuck and Collets

•

Power Chucks, a complete line

•

Rotating and Stationary Air Cylinders
and Accessory Equipment

•

Power Wrenches

•

Write us for Catalogs and Literature

THE CUSHMAN CHUCK COMPANY
HARTFORD 2, CONNECTICUT • U. S. A.

CUSHMAN

AMERICA'S FINEST—A WORLD STANDARD FOR PRECISION

VISIT US AT
THE MACHINE TOOL SHOW
CHICAGO, SEPT. 17-26, BOOTH 271

SEGMENTS

There is no surer way of selecting the correct hardness for your segmental wheels than through BAY STATE Fractional Grades. This important manufacturing refinement enables you to choose the exact degree of hardness desired by splitting every normal grade into *three* degrees of hardness, where a whole grade change would be too great.

Whether it's straight, cup, cylinder, or segmental wheels that BAY STATE supplies for surfacing equipment, maximum grinding efficiency is assured. Write us for specific recommendations.

Branch Offices and warehouses
Detroit — Chicago
Distributors — All principal cities

BAY STATE

Top Performance Consistently Duplicated

BAY STATE ABRASIVE PRODUCTS CO. • WESTBORO, MASSACHUSETTS, U.S.A.

Now you can cut

YOUR THREAD MILLING COSTS, TOO

... with M-11

"M-11", Detroit Tap and Tool Company's exclusive chrome-cobalt high speed steel enables us to offer you standard and special thread milling cutters having:

1. Higher impact strength. Less chipping or accidental breakage.

2. Greater abrasion resistance — more life between grinds.

3. Higher red hardness. Ability to run at higher speeds.

4. Greater uniformity throughout the cutter. Consistent performance, grind after grind.

. . . after 18 sharpenings

The cutter shown here, for instance, has cut two sets of 12 pitch threads, 4" and 6⅜" diameter to close tolerances on 10,000 parts of SAE 1035 steel. It has had 18 grinds and was still cutting precise threads, 16 hours a day.

What's more, "Detroit" thread milling cutters are easy to order. Most widely used types and sizes are carried in stock, ready for thread grinding to your specifications.

You can order them by number. Ask for Catalog Sheet CB-45.

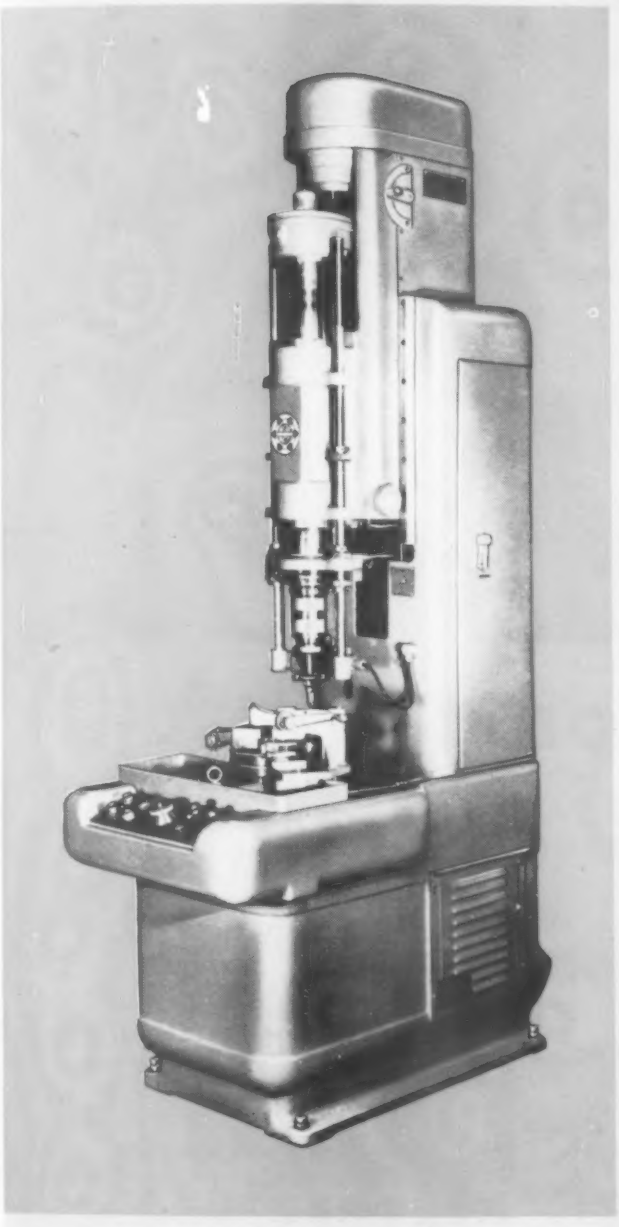
GROUND TAPS
•
THREAD MILLING CUTTERS
•
THREAD GAGES AND SPECIAL THREADING TOOLS, MACHINES AND CHECKERS

DETROIT
TAP & TOOL CO.
8432 BUTLER AVE. • DETROIT 11, U.S.A.

•
M-11 IS NOW AVAILABLE EXCLUSIVELY IN TAPS, THREAD PLUG GAGES & THREAD MILLING CUTTERS MADE BY DETROIT TAP & TOOL.
•

the greeks had **NO WORD** for it

"Precisionizing"



definition:

BETTER PRECISION MACHINING AT LOWER COST . . . BY MEANS OF

MICROHONING

The *quicker, better, lower cost method,* Micromatic "Precisionizing" includes automatic sizing, high stock removal and generation of a round and straight bore. As the piece is MICROHONED, it is automatically gauged during the operation. When correct size is reached, MICROHONING is automatically halted. Precision is within .0002" to .0005" in fast production.

Significant reduction of processing time—increase in production—reduction of rejects and scrap—make very important savings in costs. Because the skill is built into the machine, there is much less dependence on the human element. A better product is obtained along with the lower cost.

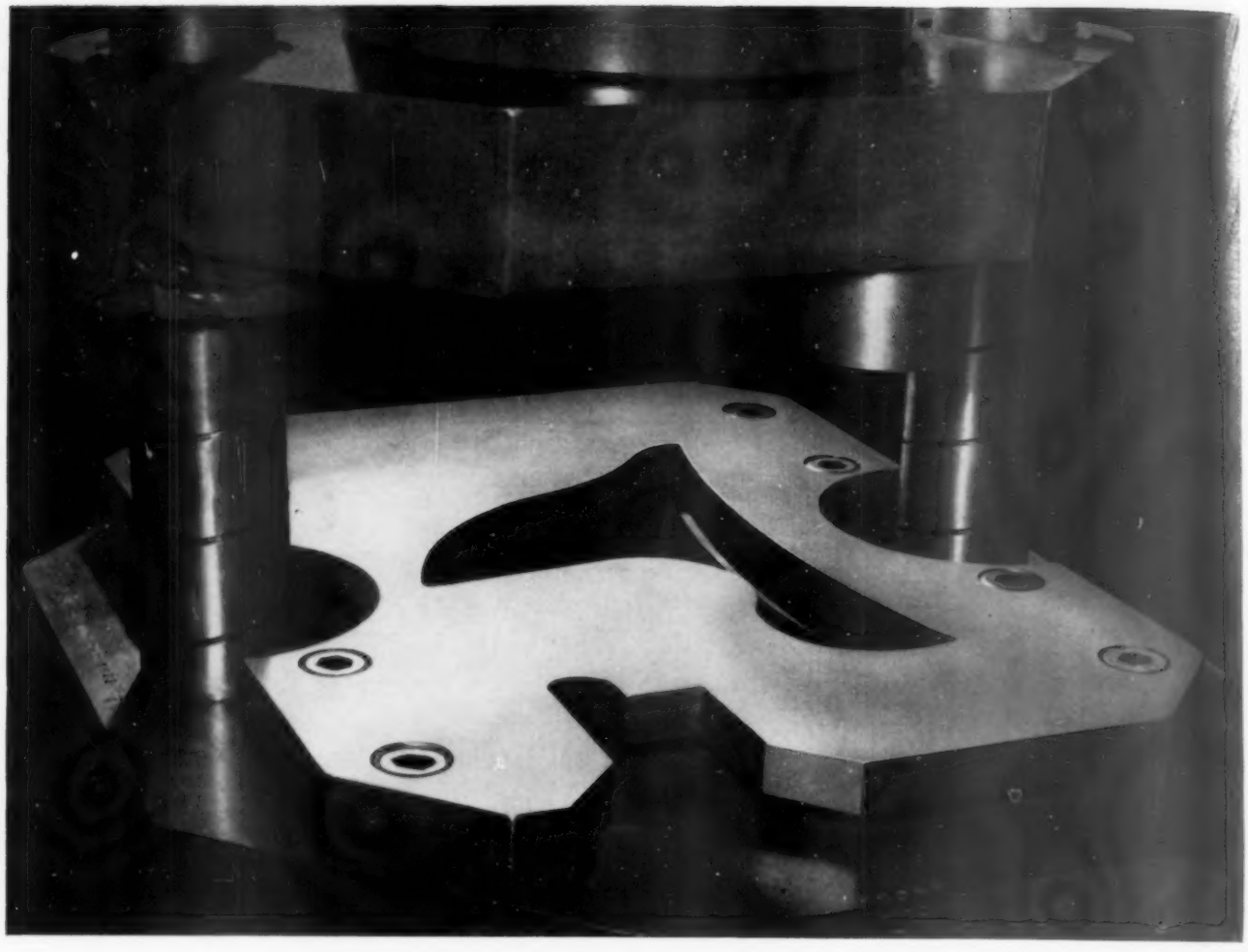
Write for INFORMATION ON THE "PRECISIONIZING" PROCESS AS IT AFFECTS YOUR OPERATIONS

MICROMATIC HONE CORPORATION

DETROIT 4, MICHIGAN

MACHINES • TOOLS • FIXTURES • ABRASIVES

LOS ANGELES, CALIF. • HOUSTON, TEXAS • ROCKFORD, ILL. • NEW HAVEN, CONN. • BRANTFORD, ONT.



THE PROOF OF THE DIE . . . IS IN THE STEEL

Heavy-duty dies cost many times the value of the steel from which they are made. Skilled die-makers must put in many long hours to insure split-hair accuracy. Equal care must be devoted to the heat-treating, finishing, and other critical operations.

But, unless they can produce and stand up under severe service, finished dies are worth nothing more than their weight as scrap. That's why it's so important to select the proper steel for dies. The best in workmanship and heat-treatment can't make a high-production die if the steel isn't right.

Bethlehem die steels have been proved by years of making good in tool and die shops. The popular grades are:

X, XCL, XX (Carbon Tool Steels) general-purpose, water-hardening

BTR (Bethlehem Tool Room) safe, oil-hardening

B A-H (Bethlehem Air-Hardening) non-distorting, air-hardening

Lehigh H (Lehigh Die, H Temper) high production, air- or oil-hardening

Each of these specialized steels has properties which make it the best choice for some specific requirement.

Whatever your die-making problems may be, you can look to Bethlehem for the "know-how" on die steels. The nearest distributor or district office will gladly give you detailed information.

Bethlehem Steel Company, Bethlehem, Pa.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

★ BETHLEHEM STEEL ★

Bethlehem **TOOL AND DIE STEELS**

Only.... 16

SQUARE FEET OF FLOOR SPACE

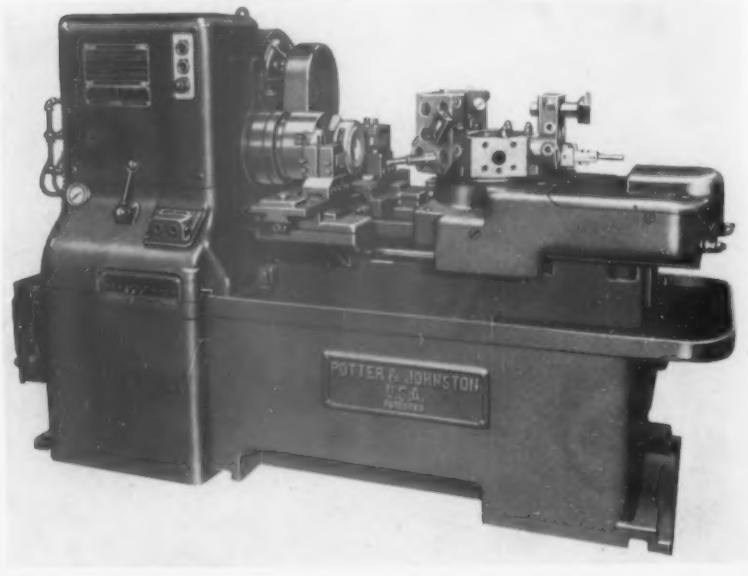
is required to accommodate the 3-U *SPEED-FLEX Automatic Turret Lathe*

P. & J.'s latest development, the 3-U AUTOMATIC TURRET LATHE, is a big potential in a small package. Fully set up, and ready to utilize its power and high speed demanded by carbide tooling, it occupies a mere 16 square feet of floor area. This is really an insignificant space requirement for a machine that:

(1) is rugged and powerful; (2) reduces cost per piece by reason of its speed and efficiency; (3) is equipped with electro-pneumatic speed control; (4) is provided with six turret faces provided for the mounting of tools; (5) that weighs 5600 lbs., boxed for shipment. The 3-U has 48 changes of speed arranged in six sets of four automatic changes. Multiple disc clutches are used for the speed changes. Other advantages are: simultaneous multiple operation; electrical equipment and motor located for maximum convenience for servicing; ease in cleaning—and, to repeat, MINIMUM FLOOR SPACE IN RELATION TO CAPACITY OF MACHINE. When you consider automatics for your production line, we respectfully suggest that you investigate our claims for the P. & J. 3-U SPEED-FLEX AUTOMATIC TURRET LATHE.

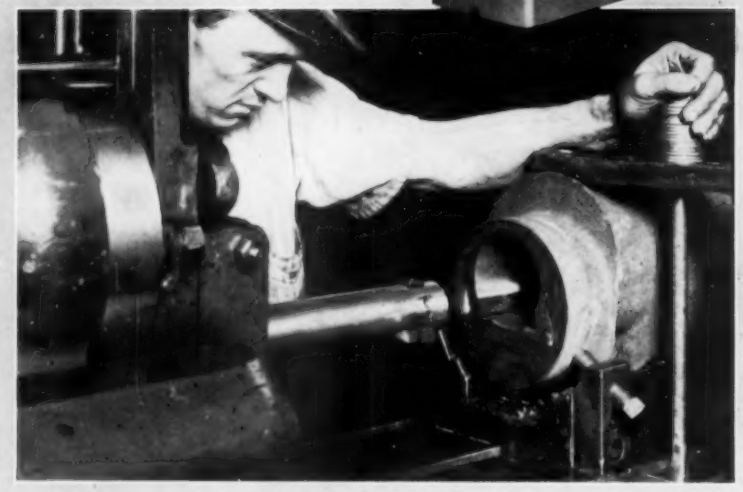
GENERAL DIMENSIONS

Swing over cross slide	8¾" Dia.
Travel of cross slide-each way	2½"
Number of turret faces	6
Diameter of hole in turret	1½"
Depth of holes in turret	Through
Distance from center of turret hole to top of turret slide	2⅝"
Total turret slide travel	6"
Turret Feed	4½"
Spindle Adjustment	3"
Cross slide adjustment	None
Diameter of hole through spindle	1½"
Horsepower required to drive	5
Net Weight	5,000
Gross weight, boxed for sea shipment	5,600
Dimensions of Case	7' 11" x 3' 9" x 4' 3"
Cubic Contents	126 cu. ft.



POTTER & JOHNSTON
MACHINE COMPANY
Pawtucket, Rhode Island

Use a SHAPER



INTERNAL SHAPING

In or out of the tool room, a Cincinnati Shaper is a dependable tool.

Planing, shaping, contouring, internal shaping, angular shaping, or universal work, are all done on this multi-use machine.

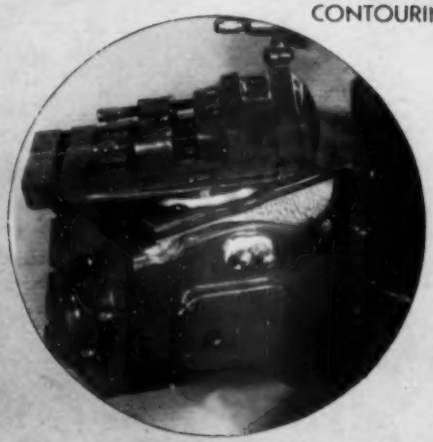
Set-up is simplicity itself.

The power, speed and accuracy of Cincinnati Shapers make them efficient for small-lot manufacturing.

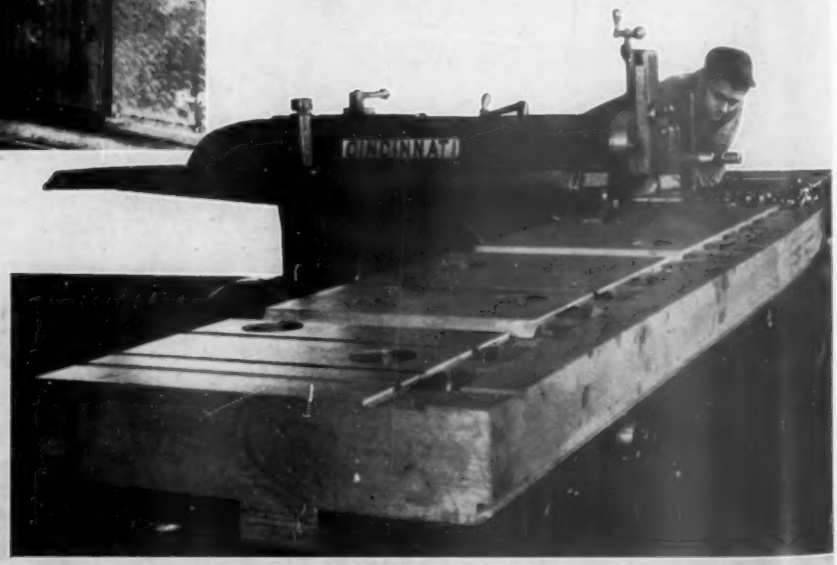
Cincinnati Shapers are profitable tools in any shop.

Write for Catalog N-3, and the practical Bulletin — Set-ups on Cincinnati Shapers.

CONTOURING



ANGULAR SHAPING



PLANING AND SHAPING

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO U.S.A.

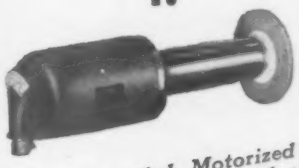
SHAPERS · SHEARS · BRAKES

Now, **YOU CAN PICK THESE SEALED PACKAGE**

POPE PRECISION GRINDING SPINDLES

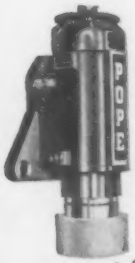
Right off the shelf!

1.



POPE Sealed Motorized 6" x 18" Surface Grinder Spindle with sealed-in 1 HP motor and *sealed lubrication* and super-precision, double row, roller bearings. Produces finer finishes. Roughs off surplus metal fast. Write for *Data Sheet No. 12.*

2.

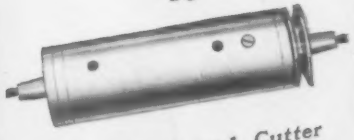


POPE Motorized Spindle for Surface Grinders and Boring Mills with *sealed lubrication* and 3, 5 or 10 HP motor running at 1200, 1800 or 3600 RPM. Produces better final finishes. Increases production. Runs in any position. Write for Data Sheets 16, 17, 18, 19.

3.

POPE Wheel Head with *sealed lubrication,* for special grinding, boring and other operations requiring from 3 to 25 HP. May be mounted horizontally or at any angle. Designed to operate at whatever speeds meet your requirements. Write for recommendations and quotations.

4.

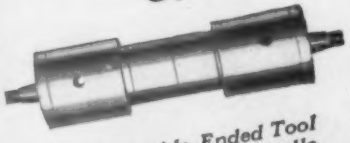


POPE Tool and Cutter Grinder Spindle with *sealed lubrication.* Operated by single Vee belt drive at speeds up to 6000 RPM. Fits standard grinders. Write for recommendations and quotations.

5.

POPE Internal Grinding Spindle with *sealed lubrication.* Comes in a wide range of sizes and speeds up to 35,000 RPM. Produces more accurate hole sizes and better finishes. Write for Catalog No. 56.

6.



POPE Double-Ended Tool and Cutter Grinder Spindle with *sealed lubrication.* Belt drive, with twin pulleys for two speeds from step pulley on motor. Speeds up to 6000 RPM. Fits standard grinders. Write for recommendations and quotations.

No. 44

POPE

POPE MACHINERY CORPORATION

ESTABLISHED 1920

261 RIVER STREET • HAVERHILL, MASSACHUSETTS

BUILDERS OF PRECISION SPINDLES

Emblematic of faithful service to our country in its time of need, the honorable discharge emblem *points out* its wearers as upstanding men and women who did a good job . . .

Just as this badge designates a job well done, your product marking designates the outstanding quality in it. Its marking identifies it as yours, protects it and you, and facilitates handling in shipment.

PRECISION PART MARKING

Matthews new Airgrit machine has gained wide acceptance for marking bearings, cutlery, engine parts, airplant parts, glass, etc. It makes a clear cut impression by means of a short blast of fine grit against a stencil mask. Complete details are in Bulletin B-1.

Jas. H. Matthews & Co., for nearly a century the complete marking house, has the answer to your question of how to mark your product . . . a complete line of marking devices to suit every need. Consult us for the answer to your problem.

JAS. H. MATTHEWS & CO.

3923 FORBES STREET PITTSBURGH 13, PA.

BRANCH PLANTS

NEW YORK, BOSTON, CHICAGO PHILADELPHIA, NEWARK, SYRACUSE

District Sales Offices: Cleveland, Cincinnati, Birmingham, Dallas

Outstanding in its class! Your best steel for mass production dies. Possesses high resistance to abrasion, non-deforming, uniform hardness penetration to center of tool. Keeps a keen edge longer than most other tool steels. Ideal for slitting cutters.

FURNISHED IN BILLETS, BAR STOCK AND DRILL ROD
BULLETIN ON REQUEST

Representatives in New York City, Plainville, Philadelphia, Pittsburgh, Detroit, Orlando, Chicago, Indianapolis, Milwaukee, St. Louis, Los Angeles

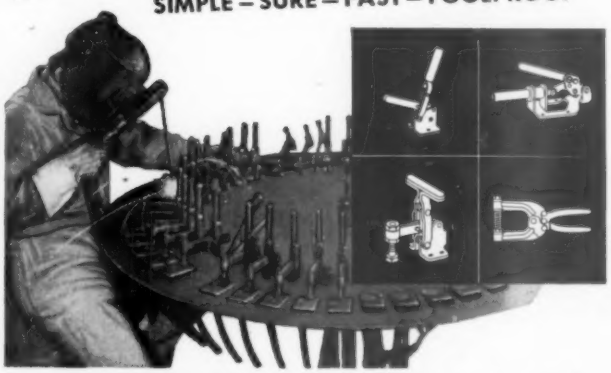
DARWIN & MILNER Inc.

highest grade tool steels

1260 W. FOURTH ST. CLEVELAND 13, OHIO

SMART TOOLING!

SIMPLE – SURE – FAST – FOOLPROOF



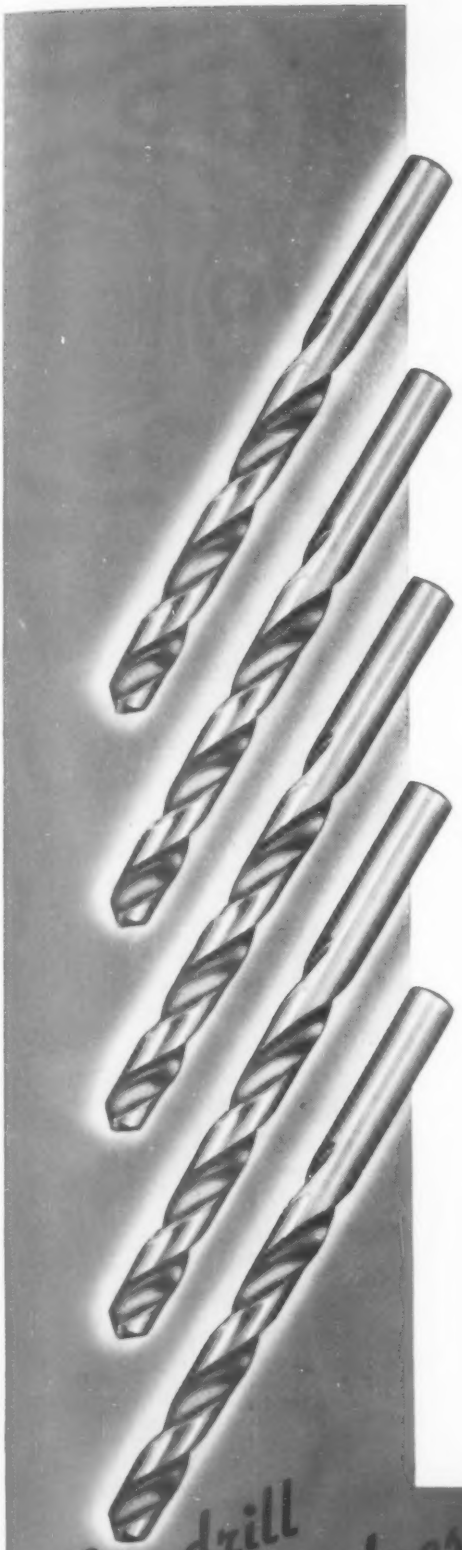
Here's efficient tooling based on the quick action and positive holding power of De-Sta-Co Toggle Clamps. This simple turntable with its 48 No. 210-S clamps enables one welder to keep abreast of two helpers. One places curved shank in socket and unloads finished assemblies. The other locates pierced hole in plate over shank and locks securely with toggle clamp. The expert welder works without interruption.

Smart tooling like this is the backbone of modern mass-production technique. You'll see De-Sta-Co Toggle Clamps playing vital parts *wherever* the principles of sound tool engineering are observed.

Welding production is *only one* of the many fields for quick acting clamps. For holding parts in milling, drilling, routing, riveting, cementing—for fast, uniform, *foolproof* action—progressive tooling demands De-Sta-Co adaptability and quality. There's a De-Sta-Co clamp for every job, designed and built to stand up under the wear and tear of volume production. Send for copy of Catalog No. 47.

DETROIT STAMPING COMPANY

328 Midland Ave. Detroit 3, Mich.



DEPENDABLE DRILL PERFORMANCE

It is easy enough to put a few drills in the shop and get a favorable report on their performance. But what about the next order . . . and the next? Will *every* drill in *every* lot give you a consistently satisfactory performance? They will if they are ACE Drills.

ACE Drills have a *uniform* high quality because the flutes are ground into solid, uniformly hardened drill length bars of high speed steel. Uniform hardness is obtained by passing mill length bars through a 22 foot long hardening furnace in a continuous line . . . bar after bar.

The bars enter and leave the furnace through small flame-sealed openings which eliminate sudden rushes of air when doors are opened as they are in batch type hardening processes. Uniform furnace conditions are thus assured. The continuous feed of the bars in the ACE process exposes each part of each bar to identical treatment resulting in thoroughly uniform heat treating. Thus ACE Drill hardness is uniform to within one-half ROCKWELL point giving ACE Drill users consistently dependable drill performance.

2256

Ace drill uniform hardness reduces down-time on automatic machines

ACE DRILL CORPORATION

MANUFACTURERS OF GROUND-FROM-THE-SOLID DRILLS AND REAMERS

13835 JENNINGS STREET DETROIT 27, MICH.

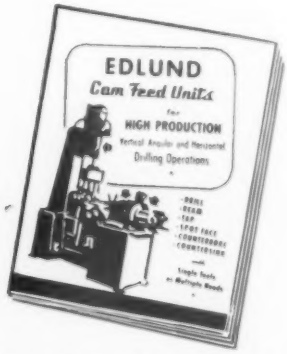
EDLUND
Cam Feed Units

High Production for Special Drilling Operations

Edlund Cam Feed Units are especially adaptable for vertical, angular or horizontal drilling operations. Combinations of Edlund Cam Feed Units No. 62 and No. 125 can be operated simultaneously, in independent batteries, or singly to simplify set-ups for difficult odd holes at angles to the main machining operations. Edlund Cam Feed Units will

- **DRILL** • **REAM** • **TAP** • **SPOT FACE**
- **COUNTERBORE** • **COUNTERSINK**

with Single Tools or Multiple Heads



Write for this Bulletin which presents full details about various applications of Edlund Cam Feed Units.

Typical EDLUND Cam Feed Unit Set-up with Four Units.

EDLUND MACHINERY CO. INC., CORTLAND 2, N. Y.

Coming

THE GREATEST INDUSTRIAL SHOW ON EARTH

SEPT. 17-26

Machine Tool Show

AT THE DODGE-CHICAGO PLANT

Make your plans now to be there. Attend the first Machine Tool Show that has been held in twelve years. There will be 12 acres of exhibits in the Dodge-Chicago Plant (now the Tucker Corporation Plant), where the engines for the B-29's were formerly made. It's the BIG show for the entire metalworking industry. Nowhere else in America is there sufficient floor space to display, under one roof, all of the exhibits of the 1947 Machine Tool Show.

INDUSTRIAL LEADERS AND PLANT OPERATORS FROM ALL OVER THE WORLD

More than 100,000 management, production, engineering, purchasing and financial executives from all over the world are going to be there. You'll find the answers to some of your present and future problems at the Machine Tool Show. You can't afford to miss it.

TOOLS NEVER BEFORE EXHIBITED

The latest equipment and newest developments will be here, ready for your inspection. The products of over 250 manufacturers—more than 1,000 new machine tools, forging machines and other metalworking machinery and equipment, of all sizes and types, will be in full operation.

TECHNICAL DEVELOPMENTS AND FUTURES

In addition to the exhibits, the Machine Tool Congress will hold nightly sessions devoted to the presentation of papers, by recognized authorities, covering outstanding new developments in metalworking techniques and processes. All who attend the Show may attend the Congress. Your badge is your admission.

WRITE FOR COMPLETE INFORMATION

Make your plans now, to attend. Send in your advance registration today. If you have not already received your copy, ask for the booklet containing information about hotel reservations, transportation from downtown Chicago to the show, etc.

AVOID DELAY AT THE GATE

Send in an advance registration blank now. Your official registration will then be completed and mailed to you, and becomes your admission to the show.

MAIL YOUR ADVANCE REGISTRATION TO:

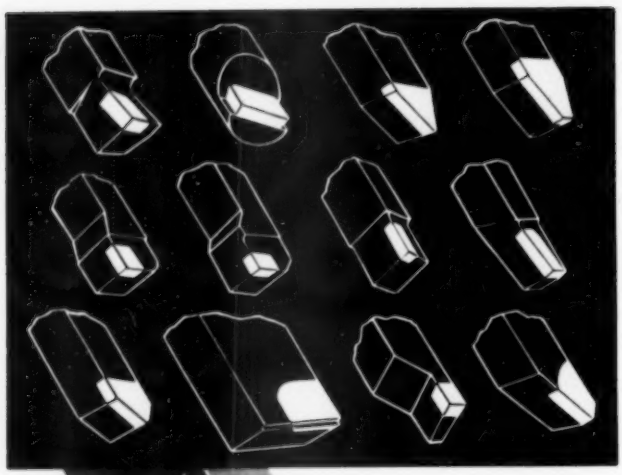
National Machine Tool Builders' Association
10525 Carnegie Avenue, Cleveland 6, Ohio

ADVANCE REGISTRATION

Name_____
(Please Print)
Title or Position_____
Company_____
Address (in full)_____

The Registration Fee is $1.00. Checks should be made payable to the Machine Tool Show

SEPT. (✓)	Please Check Dates Of Attendance
17	
18	
19	
20	
Closed Sunday	
22	
23	
24	
25	
26	



Wendt-Sonis Standard Carbide Tools are available in a wide variety of types and sizes.

for COST CUTTING.. .....on CUTTING JOBS

- *13 standard Wendt-Sonis carbide tipped tools will perform over 80% of a plant's tool bit operations.*
- *Wendt-Sonis standard tool bits can be supplied with any grade of carbide required.*
- *Standard Wendt-Sonis tool bits are stocked in Carboloy and Kennametal grades of carbide for universal machining operations.*
- *Nationwide sales and service organization of established W-S distributors stocks a complete line of W-S standard products.*

W-S standard tool bits are "Color Marked" for easy identification as to use on steel or non-ferrous materials. All shanks are rust resistant—also heat-treated for greater rigidity. Cutting edges are diamond ground for longer wear and better finish. All these advantages put the Wendt-Sonis line at the top as a money maker for you. Get details!

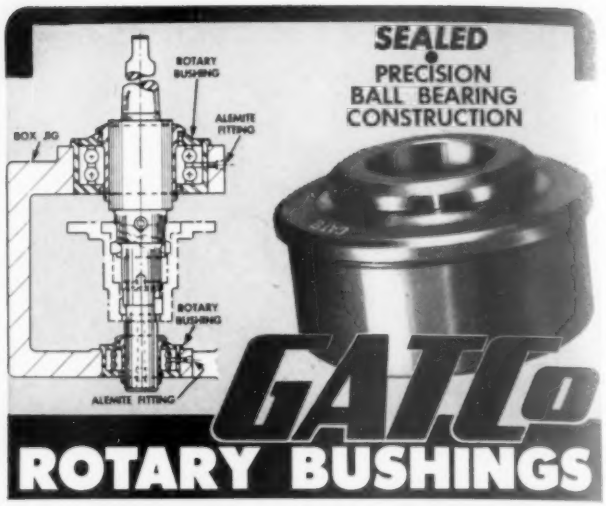
Free! **NEW CHIP-BREAKER CHART**

Contains illustrations of chip-breakers, grinding instructions, and recommendations for their use. Chart size—with handy tab for wall hanging. To get FREE chart WRITE: Wendt-Sonis Company, Hannibal, Missouri or 580 N. Prairie Ave., Hawthorne, California

WENDT SONIS

CARBIDE TIPPED CUTTING TOOLS

BORING TOOLS • CENTERS • COUNTERBORES • SPOT-FACERS • CUT-OFF TOOLS • DRILLS • END MILLS • FLY CUTTERS • TOOL BITS • MILLING CUTTERS • REAMERS • ROLLER TURNING TOOLS • SPECIAL BITS



SEALED
PRECISION BALL BEARING CONSTRUCTION

GATCO ROTARY BUSHINGS

FOR DRILLING, CORE DRILLING, ROUGH AND FINISHED BORING

The inner race of the GATCO bushing rotates with the tool, piloting the tool accurately below or above the work—or both.

Eliminates expensive tool construction—Reduces tool wear—Prevents seizure and pilot breakage—Especially adapted where precision is required.

Write for full information and prices

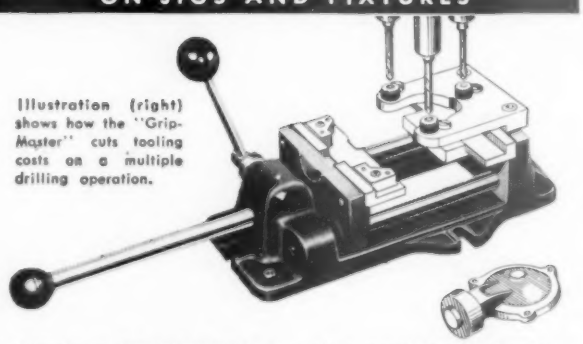
GIERN & ANHOLTT TOOL CO.
1302 Mt. Elliott Avenue • Detroit 7, Michigan

USE THE "WORLD'S FASTEST" VISE

CUT COSTS UP TO 75%

ON JIGS AND FIXTURES

Illustration (right) shows how the "Grip-Master" cuts tooling costs on a multiple drilling operation.

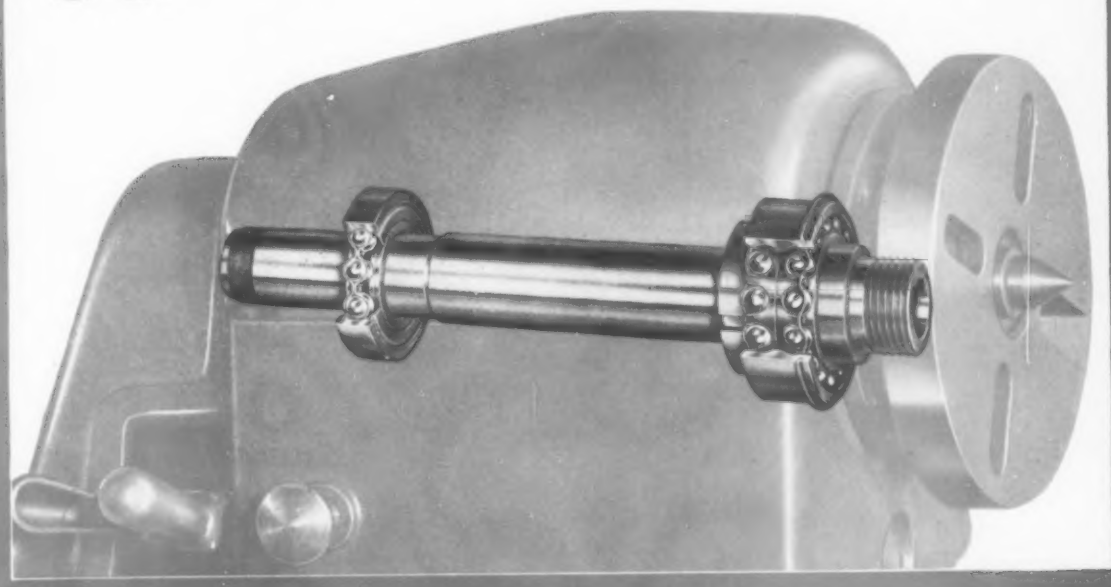


Here's a SCREWLESS vise that provides a simple, ready-made base structure for drilling, tapping and assembly operations. Eliminates need for developing costly special jigs. Instantaneous, effortless setting makes Heinrich "Grip-Master" the World's fastest vise. Guaranteed, positive locking keeps work securely in place. Built-in bosses and removable parallels permit easy attachment of bushing plates and locating jaws. "Grip-Master's" large jaw openings and *screwless* operation makes loading and unloading a *presto* proposition.

Grip-Master
DRILL PRESS TYPE
SCREWLESS VISE

NATIONAL MACHINE TOOL CO., Dept. 187-F, RACINE, WIS.

Logan A NAME TO REMEMBER WHEN YOU THINK OF BETTER LATHES



BALL BEARING SPINDLE MOUNTING

permits higher cutting speeds, requires no bearing adjustment... sustains accuracy of LOGAN Lathes

Quick Change Gear Cabinet Turret Lathe

SPECIFICATIONS COMMON TO ALL LOGAN LATHES . . . swing over bed, 10½″. . . bed length, 43⅛″. . . size of hole through spindle, 25/32″. . . spindle nose diameter and threads per inch, 1½″—8 . . . 12 spindle speeds, 30 to 1450 rpm . . . motor, ½ hp, 1750 rpm . . . ball bearing spindle mounting . . . drum type reversing motor switch and cord . . . precision-ground ways, 2 V-ways and 2 flat ways.

With its spindle turning on a pre-loaded ball bearing mounting of extreme precision, the Logan Lathe is inherently well adapted to accurate work at higher spindle speeds. This fact permits the Logan Lathe operator to use modern high speed carbide cutting tools to full advantage. It assures a minimum of spindle deflection due to pressure of the cutting tool. It means, too, that no bearing adjustment is required within the full range of the Logan spindle speeds, 30 to 1450 rpm. Consequently, the accurate factory alignment of the Logan spindle is not disturbed by periodic bearing adjustments, and original accuracy is sustained. Grease sealed, the Logan Ball Bearing Spindle never needs lubrication. All these characteristics of the Logan Ball Bearing Spindle Mounting are important factors in the proved ability of Logan Lathes to increase output and decrease costs on production lines, and to do faster, more accurate cutting jobs in the tool room. For full information, see your nearest Logan Lathe dealer, or write direct for the Logan Lathe catalog.

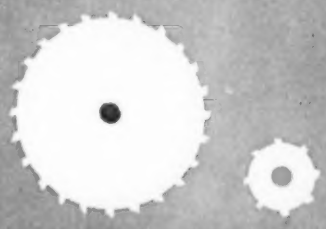
M-1

LOGAN ENGINEERING CO. CHICAGO 30, ILLINOIS

Specials ARE OUR Specialty

DESIGN

A complete engineering service, backed by an experienced staff, is at your service to make recommendations and design special cutters.



RANGE

Hundreds of sizes, dozens of models to meet every requirement, regardless of machines used or materials to be cut.

SERVICE

Even special tools use standard parts which are stocked by us. There are 20 Lovejoy service centers throughout the U.S.A. — there is one near you.

30 YEARS' SATISFACTION

Nearly 30 years' continuous experience making milling cutters and other "Positive-Locking" tools. Our first customers are still buying our tools.

The right tool for the job often means a special tool and that usually means an expensive tool. But **not** when you come to Lovejoy, because specials are our specialty—and we offer something extra special when it comes to designing and making them.

Part of that extra-special something is the fact that all our custom-made tools use a majority of **standard** parts. They are built around the famous Lovejoy positive-blade locking device and use Lovejoy interchangeable blades. This means lower initial cost, longer blade life, faster, more accurate production and simpler maintenance. The rest is made up of our nearly thirty years of experience in designing and making all types of inserted-cutter tools and a nationwide service organization that's of real value to owners of Lovejoy special tools, because Lovejoy specials have so many standard parts.

For a few examples of Lovejoy specials, see the illustrations above. They include a rugged dovetail cutter, two face mills—one 24" in diameter, the other 2½" in diameter, a special boring head, and a husky slotting cutter. All use interchangeable carbide-tipped Lovejoy blades.

If your work requires special cutters, you can make no better move than to send your problem to Lovejoy, because specials are our specialty.

ALWAYS SPECIFY LOVEJOY

LOVEJOY TOOL COMPANY, INC.
SPRINGFIELD, VERMONT, U. S. A.

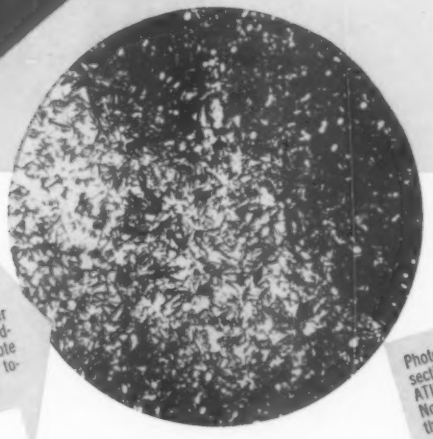
...isn't it time for a change?

YESTERDAY

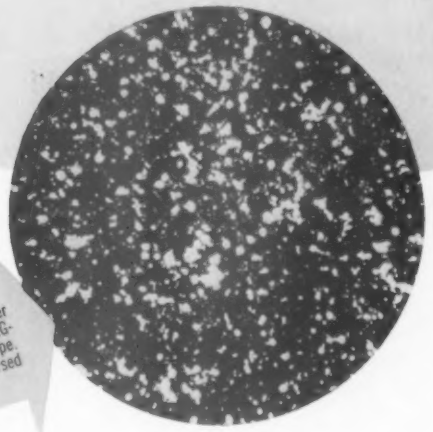
Carbide segregations in high alloy steels were accepted as a necessary evil. The hard brittle areas that thus resulted caused trouble during machining and heat-treating and led to service failures.

...TODAY

LATROBE offers dispersed-segregate steels, an original development which assures you tool and die steels free from former objectionable carbide segregations. These advanced steels set new standards of uniform quality, better performance, longer life!



Photomicrograph of center section 2¾" round, standard process M-2 type. Note segregations clustered together.



Photomicrograph of center section 2¾" round, DESEGATIZED Brand of M-2 type. Note segregates dispersed throughout structure.

Once the clock stood still, now it moves forward. Once you had to put up with tool failures and die break-downs, now you can change to Latrobe's *DESEGATIZED* Brand of Dispersed-Segregate Steels.

Write for either or both of our new bulletins, describing Latrobe's Desegatized Brand of Dispersed-Segregate Steels—one on High Speed Tool Steels and the other on High Carbon-High Chrome Die Steels.

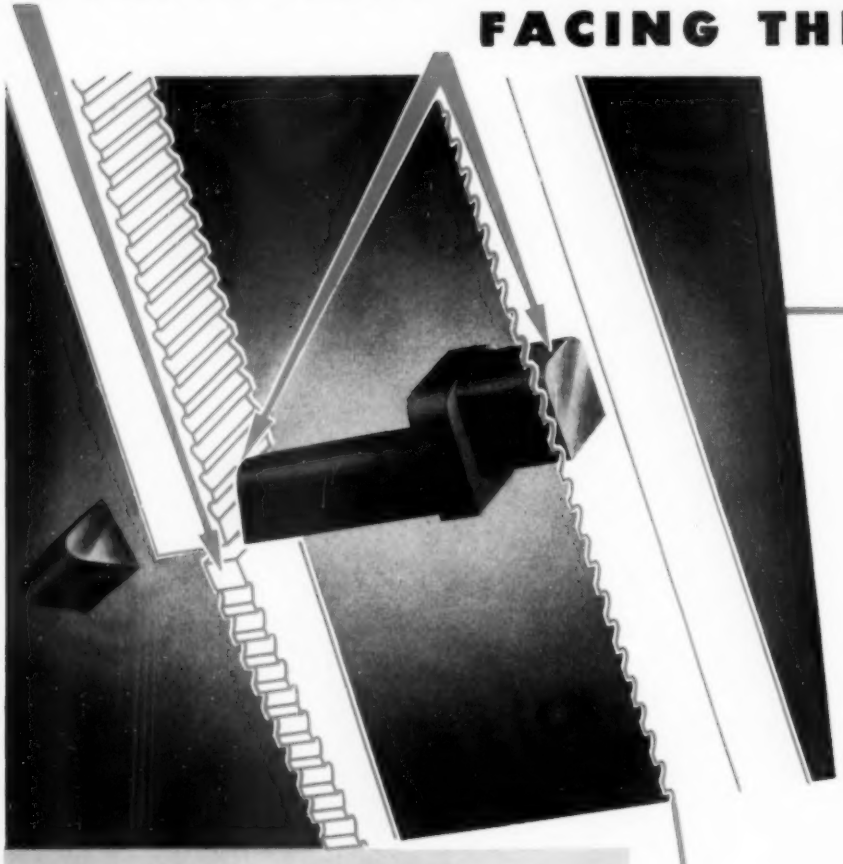
LATROBE
DESEGATIZED
BRAND OF
Dispersed-Segregate STEELS

3

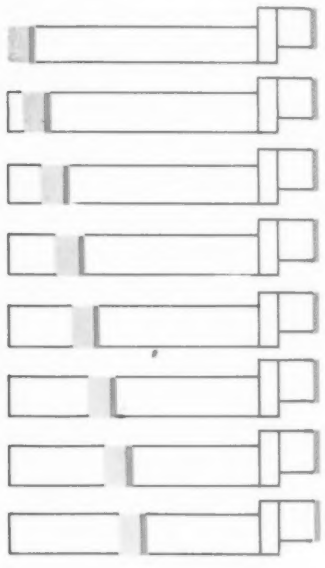
LESCO

LATROBE ELECTRIC STEEL COMPANY • LATROBE, PENNSYLVANIA

BROACHING THROUGH TO LENGTH— FACING THE ENDS IN *One Stroke*



PART: Turbine Wheel Bucket
MATERIAL: Stainless Steel Forging
MACHINE: Vertical, Single Slide, 10-Ton Broach
LIMITS: ±.001
PRODUCTION: 300% Increase Over Previous Method



And **8 DIFFERENT PART LENGTHS** *broached* **FROM ONE FORGING—** *with one set-up*

Chances are you don't make steam turbines or turbine wheel buckets. But if you are cutting metal, *and want to do it fast—broach it.*

"300% production increase over previous method." These are typical results when broach tooling, designed and built by Detroit Broach, is put on the job . . . worthwhile results in today's struggle with higher production costs.

Detroit Broach will gladly consult with you and determine actual cost and production facts on your applications no matter what type of broaching is required. Write today.

BROACHING TOOL INSTITUTE

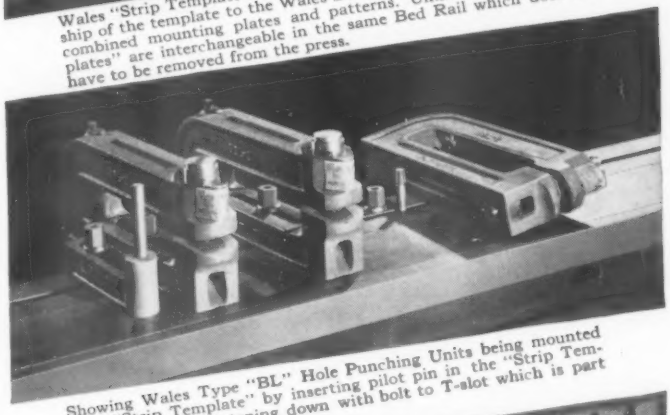
DETROIT *Broach* COMPANY

20201 SHERWOOD AVENUE • DETROIT 12, MICHIGAN

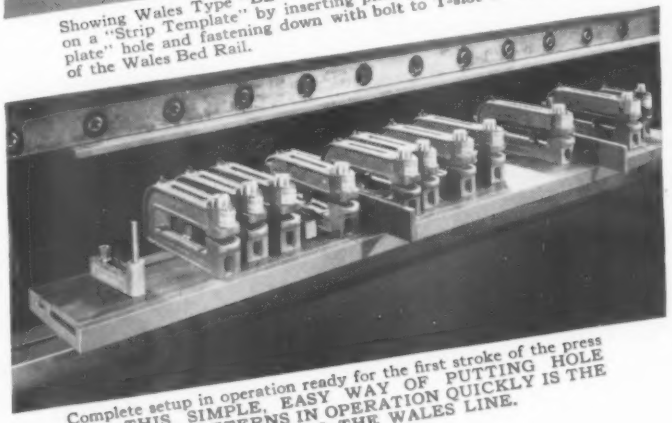
Nothing can be

WHAT COULD BE SIMPLER FOR HOLE PUNCHING THAN THE WALES *patented* AND EXCLUSIVE TEMPLATE MOUNTING METHOD*

Wales "Strip Template" with mounting holes showing the relationship of the template to the Wales Bed Rail. "Strip Templates" are combined mounting plates and patterns. Unlimited "Strip Templates" are interchangeable in the same Bed Rail which does not have to be removed from the press.



Showing Wales Type "BL" Hole Punching Units being mounted on a "Strip Template" by inserting pilot pin in the "Strip Template" hole and fastening down with bolt to T-slot which is part of the Wales Bed Rail.



Complete setup in operation ready for the first stroke of the press ram. THIS SIMPLE, EASY WAY OF PUTTING HOLE PUNCHING PATTERNS IN OPERATION QUICKLY IS THE NEWEST INNOVATION TO THE WALES LINE.

one important application is in combination with . . . WALES Type "BL" HOLE PUNCHING UNITS

● *Only Wales Hole Punching and Notching Equipment has this simple setup method* that provides these NEW money-saving and time-saving advantages.

Wales Patented Mounting Method requires *only one template*. This template serves the dual purpose of being a combined mounting plate and pattern. Faster setups, almost complete elimination of press "down time", and easier storing of templates and mounting plates are *economies that cannot be overlooked by today's cost-conscious Production Executives.*

Store the templates and you store the die without Wales Hole Punching and Notching Equipment.

BUT this patented template setup method is only *one* part of the total savings. The other part, equally important, is the efficiency and economy produced by the Wales Hole Punching and Notching Equipment.

For example:—Before the availability of Wales Equipment, it was necessary to design and custom-build a completely new "fixed" die for each pattern. This required special punches and punch plates, special stripper plates, and special die buttons and die plates for each die. NOW—a group of these self-contained, permanently aligned Wales Units may be set up in unlimited patterns and put into operation the same day a pattern is released for production.

Tooling with Wales Equipment is reduced to a simple, quick assembly operation. Also the same group of Wales Hole Punching and Notching Equipment may be used and reused in an unlimited number of setups.

THE SIMPLICITY AND ECONOMIES OF WALES EQUIPMENT IS TOO BIG A STORY TO TELL ON THIS PAGE *SO WRITE FOR FULLY-ILLUSTRATED, FUNCTIONALLY-COLORED CATALOG TODAY.*

* *Note:* The Wales-Strippit Corporation has not granted permission to anyone to use this patented mounting method *except with Wales Hole Punching and Notching Equipment.*

WALES-STRIPPIT CORPORATION

GEORGE F. WALES, President

393 PAYNE AVENUE, NORTH TONAWANDA, N. Y.

WALES-STRIPPIT OF CANADA LTD., HAMILTON, ONTARIO

Specialists in Punching and Notching Equipment

TOOL FOR PROFIT
WITH
ELGIN
Sapphire
WEAR RESISTANT

CONTACT POINTS

Sapphire Tipt dial indicator contact points outwear hardened steel 100 to 1 and tungsten carbide more than 10 to 1. Do not scratch or mar finest finishes. Standard or to your specifications.

REFER D-15—SAPPHIRE SHORTS

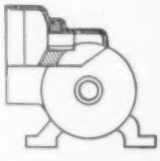
SAPPHIRE TIPT CENTERS

Smooth, highly polished Sapphire Tipt centers in constant use in the tool room of a well known manufacturer for more than one year show no wear. For those grinding and turning jobs that must be "right" specify Elgin Sapphire.

REFER D-11—SAPPHIRE SHORTS

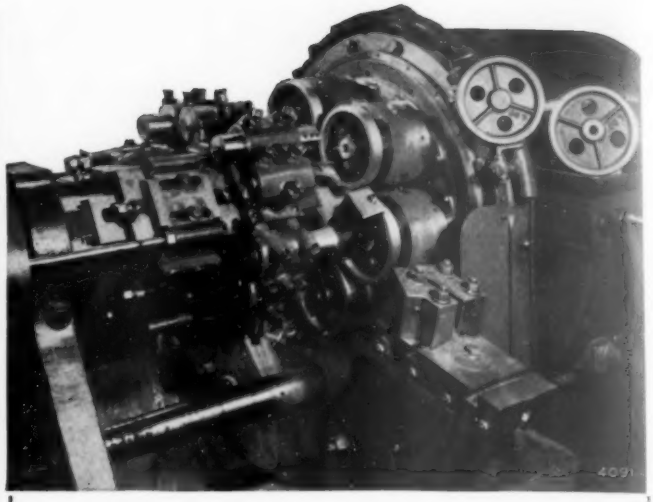
SIZING BEARINGS

When mounting powdered metal bearings, an out of roundness and tapered condition occurred. A Sapphire sizing—burnishing tool chucked in a high speed drill press was the answer. Result: Sized to .0003; high finish.



REFER D-12—SAPPHIRE SHORTS

WRITE FOR DETAILS AND
ENGINEERING ASSISTANCE
Sapphire
PRODUCTS DIVISION
ELGIN NATIONAL WATCH COMPANY
AURORA • ILLINOIS



GEAR BLANKS ARE TURNED ACCURATELY AND SPEEDILY ON

"BAIRD" AUTOMATIC CHUCKING MACHINES

Here is shown a "Baird" No. 76H Chucking Machine, set up for turning, facing and boring gear Blanks made of a Special Cast Iron having a Rockwell hardness—85—90 B Scale.

The O.D. is finished turned to 6.800 plus or minus .001 and both faces are finished to 1.000 width, plus or minus .001.

The Hole is finished bored and reamed .750 diameter to plug gage and is concentric with the O.D. turning within .001 total indicator reading.

The work is held in Standard "Baird" Three Jaw Contracting Chucks, using stud type jaws for gripping. (The Spindle Turret is shown partially indexed to better illustrate the method of chucking.)

This gear is completely turned as shown to the required accuracy at the rate of 55 pieces per hour.

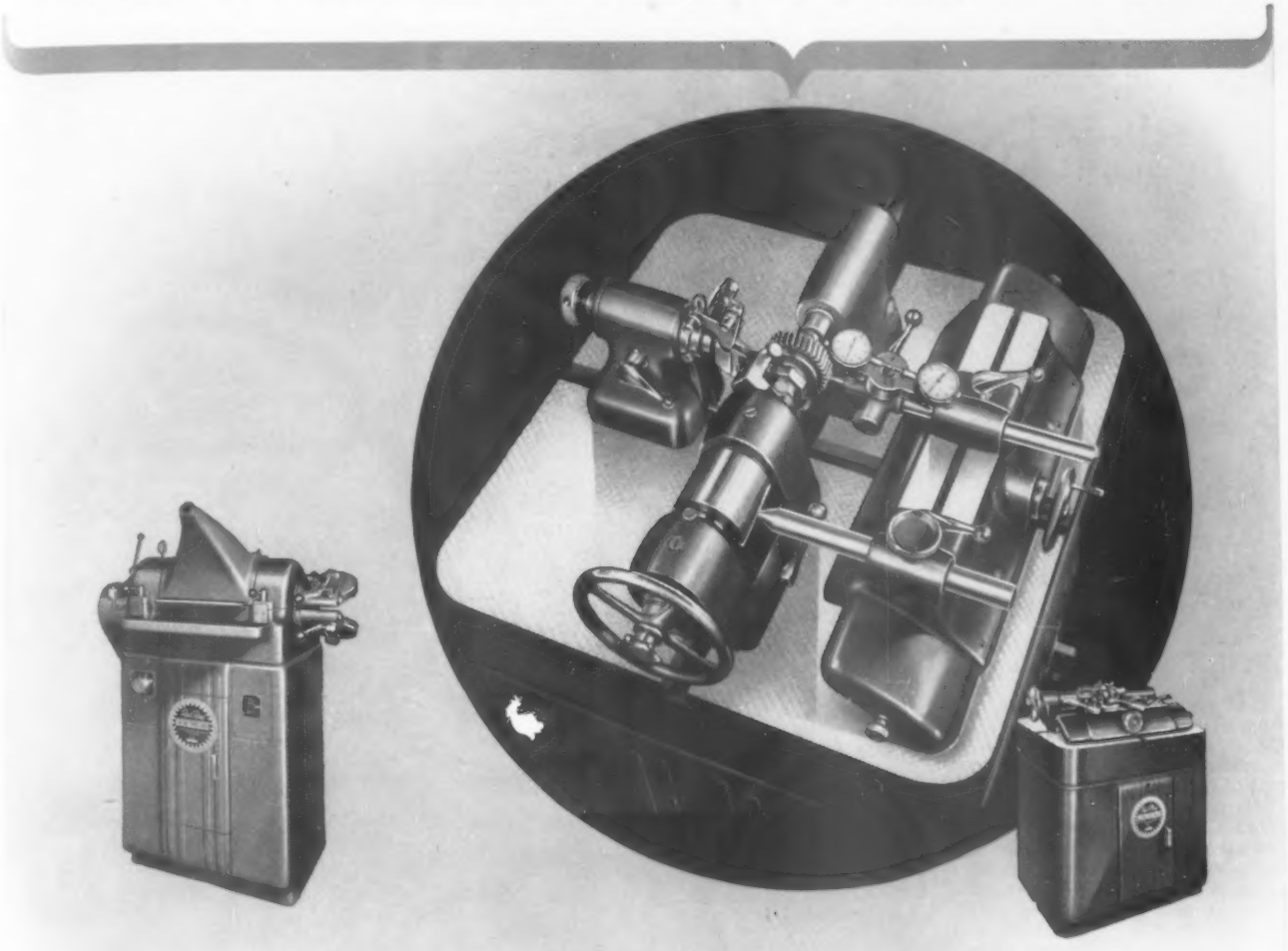
Selection of a spindle speed for each position, which is a special Baird Feature, permits high Spindle speeds in the finishing positions where carbide tools are used to produce the fine accurate surfaces required.

When you have Turning Operations that should be done profitably

"ASK BAIRD ABOUT IT."

THE BAIRD MACHINE COMPANY
STRATFORD, CONN.

FIRST MEASURE YOUR GEAR ERRORS AND GEAR NOISE THEN CORRECT THEM



If you know how much of an error you have in index, helical angle, lead, parallelism, tooth size, eccentricity or interference, you can determine what must be done to correct it.

If there is apt to be objectionable noises in a gear train, find out before those gears are assembled just how much noise they will make in operation. Then you can take the necessary steps to correct for noise without paying unnecessarily for both assembly and disassembly.

The Red Ring Universal Gear Checker and Gear Sound Tester will permit you to accurately evaluate gear errors and gear noises. The Sound Tester will, by the character of the sound produced, indicate its cause.

Write for descriptive folders on these machines.

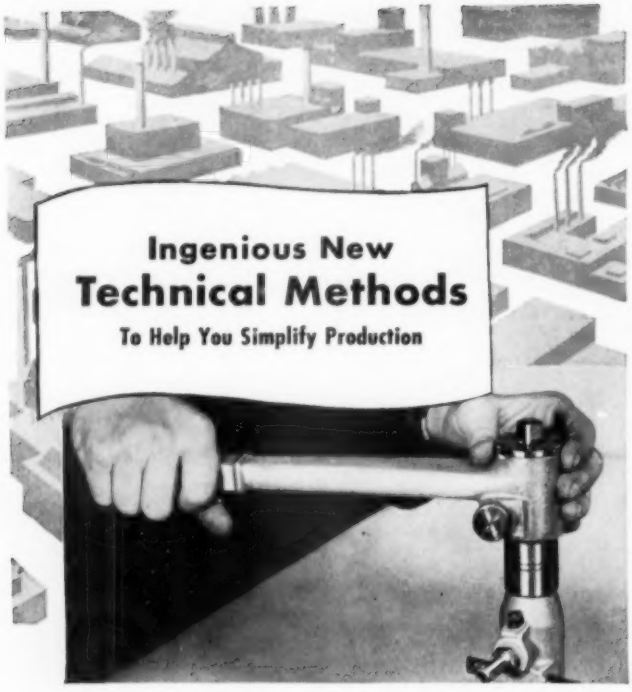
2525

RED RING PRODUCTS

NATIONAL BROACH AND MACHINE CO.

5600 ST. JEAN • DETROIT 13, MICHIGAN

SPECIALISTS ON SPUR AND HELICAL INVOLUTE GEAR PRACTICE • ORIGINATORS OF ROTARY SHAVING AND ELLIPTOID TOOTH FORMS



New Type of Torque Tools Incorporate Spring Clutch! . . . Are 98% Accurate!

Acme Torque Wrench and Screw Driver both incorporate spring clutches, with easily operated control. After setting control to desired torque, the operator merely turns tool in the usual way. When the torque required to drive the threaded part exceeds the pre-set value, the tool slips. Impact doesn't cause driving torque to increase. Oil doesn't affect setting which is reproducible within 2% or better.

Torque Screw Driver

The Wrench offers right and left-hand drive, ratchet action and withdrawal. Spring clutch may be set from 0 to 500 inch pounds. Standard sockets are interchangeable. The Screw Driver may be set for any value of torque from 0 to 35 inch pounds. A ratchet action is incorporated. The same tool will also withdraw screws. Standard bits, including socket types, may be easily inserted. The tool is made of pressure cast aluminum.

Another Time-Saver on the job, is chewing gum. The act of chewing aids the workers' concentration—seems to make the work go easier. Chewing gum may be used even when workers' hands are busy; reducing interruptions from the job. For these reasons many plant owners have made Wrigley's Spearmint Gum available to everyone.

You can get complete information from Acme Scientific Company, 1450 W. Randolph St., Chicago 7, Ill.

AB-65

I-T-E Circuit Breaker Co. Reveals 57% Reduction In Slotting Time!

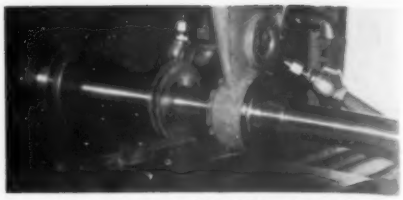


Photo Courtesy of I-T-E Circuit Breaker Co.

Nelco Carboloy-Tipped Tools Cut 100 Slots IN 1.4 HOURS

Instead of former 3.2 hrs. with usual steel cutters

In Gangs of 2 (Sometimes 3) Nelco Carboloy-Tipped Cutters Set New Records

Compare This Record

Job. Cut slot ½" deep, 5" long, .252 wide.
Material: Hard extruded copper terminal block
Machine: Kearny & Trecker, 20 CSM Milling Machine, Horiz. Type, Spindle RPM of 1250

With Usual-Type Steel Cutters

3.2 hours to cut 100 slots.
Table feed of 5⅛" per min.
Did not hold size due to high amount of wear caused by hard copper.

With NELCO Carboloy-Tipped Cutters

1.4 hours to cut 100 slots.
Table feed of 90" per min.
3200 slots obtained before dulling or loss of size occurs.

All Nelco Tools are designed and made to make production faster, better. Write for the new Nelco catalog and for distributor nearest you.

NELCO TOOL CO., INC.

For That EXTRA EDGE In Production
370 Hamilton Avenue, Dept. 8, Brooklyn 31, N.Y.

A WHOLE SHOPFULL OF TOOLS IN ONE

Machinist - craftsmen find it unsurpassed for grinding, drilling, routing, carving, sanding, polishing and 9,994 other uses. Precision-engineered, AC - DC, with more exclusive features than any other tool.

Exclusive finger-grip brings hand closer for finer work

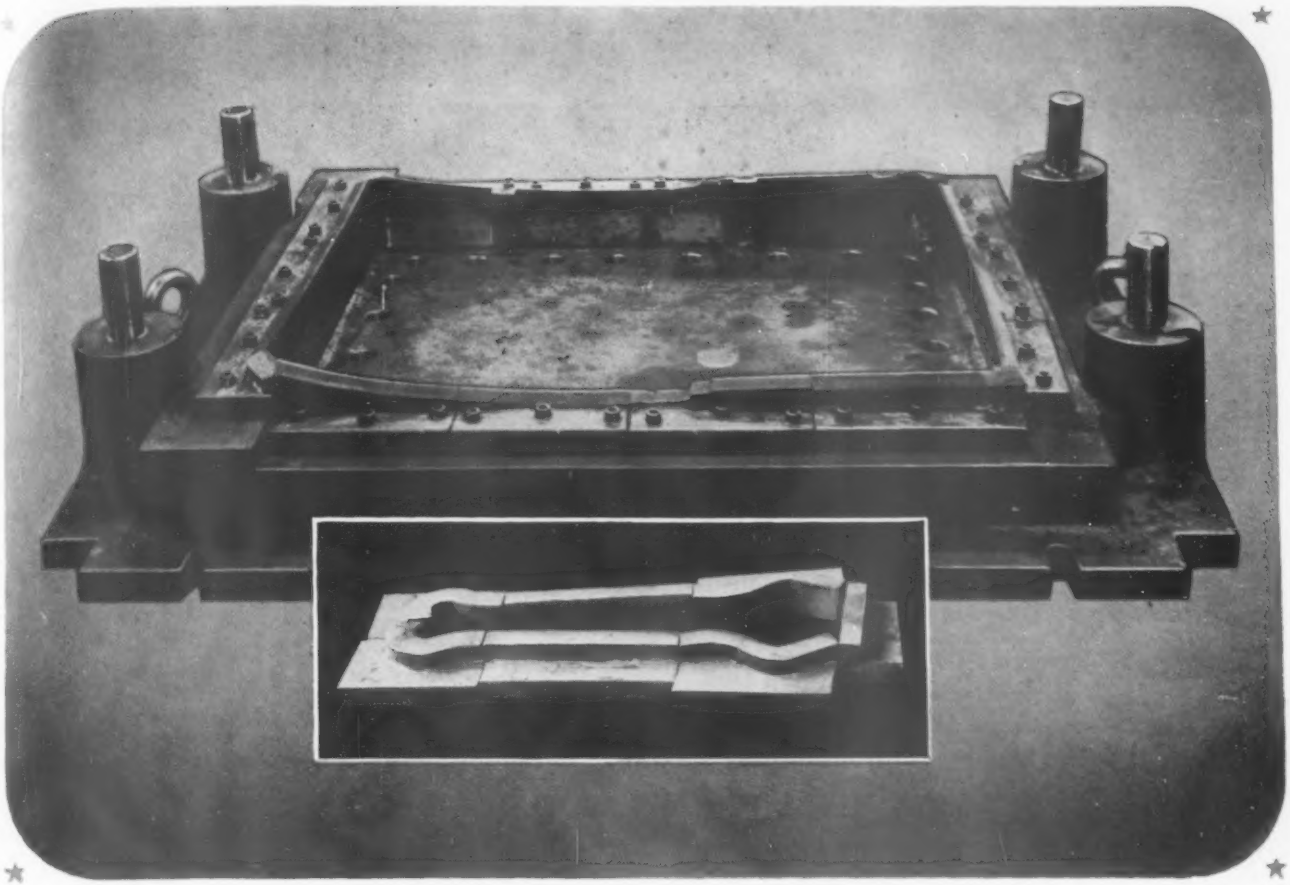
Complete with 36 accessories in fitted steel case

$22.50

$32.95 value if purchased separately

CASCO Electri-Craft Tool Kit

CASCO PRODUCTS CORPORATION • BRIDGEPORT 2, CONN.



When time is precious—

SPEED YOUR DIE MAKING

SAVE MONEY TOO

Write for New Booklet:

COMPOSITE DIE SECTIONS

Contains complete data on 35 Standard Die Sections, from combinations of which thousands of die shapes can be made—also full information on Special Die Sections, and how to order.

Get Your Copy—
Write for it Today.

ADDRESS DEPT. TE-54

W & D 567

FCC Composite Die Sections are quickly available to your order. Shipment to your specifications can usually be made in five to ten days.

On large dies or small for blanking, beading or trimming, these prefabricated die parts save steel, and a vast amount of time and trouble in the die shop.

They are made of fine tool steel cutting edges in a selection of grades, electrically butt welded by a special process to non-hardenable mild steel bases. Accurate temperature control assures uniformity of behavior in heat treatment.

Further information is available from any Allegheny Ludlum field representative, or write us direct for engineering data (see details at left).

AL

ALLEGHENY LUDLUM

STEEL CORPORATION

Forging and Casting Division

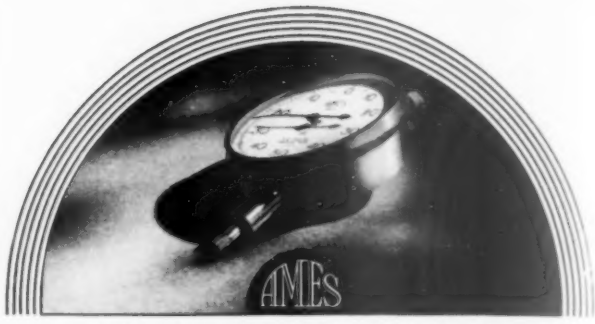
Detroit 20, Michigan

Save three ways with Grand Rapids No. 10-B Combination Tap and Drill Grinder: 1. Lower first cost; 2. Less maintenance expense; 3. Valuable floor space.

Write for Bulletin G.L. 8-46

Grand Rapids 10-B Combination Tap and Drill Grinder

GALLMEYER & LIVINGSTON COMPANY
Manufacturers of Grand Rapids Grinders
110 STRAIGHT ST., S. W., GRAND RAPIDS 4, MICH.

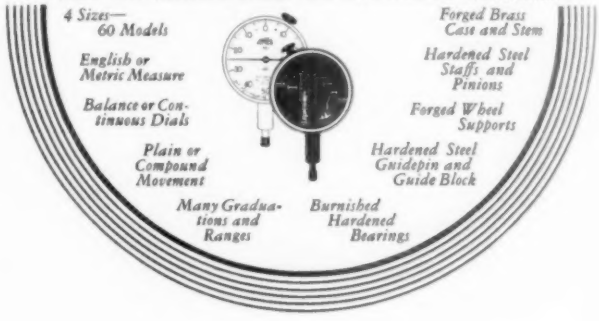


THE *ON-THE-JOB* INDICATOR

Because every part and assembly is designed and built for *lasting protection* of initial sensitivity and accuracy, AMES Dial Indicators give more *on-the-job* time—require fewer adjustments—set a higher standard for speed and economy in checking procedure. For assistance in solving your measuring problems, a complete engineering service is available—without obligation.

Representatives in principal cities **B. C. AMES CO.** *30 Ames Street Waltham 54, Mass.*

MANUFACTURER OF MICROMETER DIAL GAUGES AND MICROMETER DIAL INDICATORS



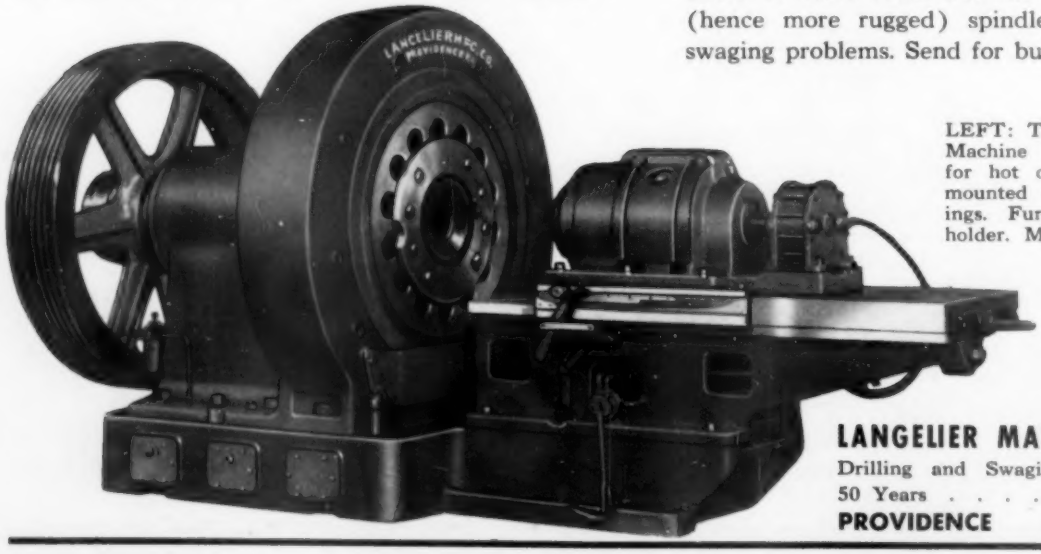
NEW DESIGN

LANGELIER

Swagers

EFFECT BIG SAVINGS!

Whether your swaging needs involve pin-pointing or pointing 7″ dia. tubes—there is a modern, improved Langelier Swaging Machine that will do the work speedily, accurately, efficiently—and deliver important economies in machining costs. More than 50 years of swaging "know-how" are built into every Langelier Swager. Here's just one important advancement: Timken-mounted spindle reduces power consumption, decreases friction, lengthens life of parts as compared with old-style plain bearing mountings; also assures close concentricity between revolving spindle and circle of head rolls. Permits use of much shorter (hence more rugged) spindle. Let us solve your swaging problems. Send for bulletins.



LEFT: Type J, K and L Swaging Machine has water-jacketed head for hot or cold swaging. Spindle mounted on Timken roller bearings. Furnished with or without holder. Machine as shown here is equipped with hydraulic feeding mechanism and pneumatically operated rotating chuck: Capacity, tubing: Type J, 4″. Type K, 4½″. Type L, 6½″.

LANGELIER MANUFACTURING CO.
Drilling and Swaging Specialists for Over 50 Years . . . . . Incorporated 1887
PROVIDENCE • RHODE ISLAND

A Two-Way Cut in Grinding Costs with BESLY GRINDERS

GET THIS FREE CATALOG

You'll find it helpful. It contains valuable data on grinding wheels and abrasives. Know the facts about Besly Titan Steelbacs . . . they save "down time" and boost production.

This 218-20" Besly Grinder is tooled for finish grinding the stem ends of automotive valves from .309" to .434" dia.—in lengths from $4\frac{7}{16}$" to $6\frac{15}{32}$". Out-put is 30 valves a minute with a 15-20 micro-inch finish. Ends are ground square with stem within a tolerance of .0003" and, locating from taper seat, are held within .002" for length.

Net results are increased output at a lower labor cost per unit—*plus* a saving in capital investment (one grinder handles all valve stem sizes with a single fixture).

This design shows what can be done to step up production on "difficult" operations. It is typical of the kind of production grinding problems that Besly men are called on to solve in the fight to cut costs and improve product quality.

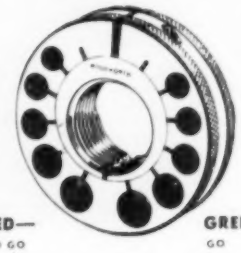
Why not talk your own needs over with a Besly engineer? Write today!

BESLY

BESLY GRINDERS AND ACCESSORIES
BESLY TAPS • BESLY TITAN ABRASIVE WHEELS

CHAS. H. BESLY & COMPANY: 118-124 N. Clinton Street, Chicago 6, Ill. • Factory: Beloit, Wis.

Pat. Pending



RED— NO GO

GREEN— GO

ACCURACY YOU CAN TRUST

5-PLUS FEATURES

1 Greater accuracy and stability
2 Longer wear life
3 Less weight
4 Positive identification
5 Positive adjustment

ACCEPTED! THREAD RING GAGES

No wonder more and more industries are adopting this gage as standard. Its revolutionary design assures wear life 5 to 7 times longer. And maintains accurate inspection. Just try the Woodworth Thread Ring Gage on your extra tough job—and you, too, will standardize!

Wire or write for folder No. 46R at no obligation.

WOODWORTH

N. A. WOODWORTH CO., SALES DIVISION • 1300 E. NINE MILE ROAD • DETROIT 20, MICHIGAN
COMPLETE LINE OF PRECISION GAGES • DIAPHRAGM CHUCKS • CONE-LOK JIGS

"SPECIALS"

MADE TO YOUR SPECIFICATIONS

REED

GROUND & LAPPED KNURLS

Prompt Delivery on Standard Knurls
More than 100 Sizes and Styles of REED Standard Knurls in stock in High Speed Steel.
Write for Catalog No. 62

REED ROLLED THREAD DIE CO.
Formerly ROLLED THREAD DIE CO. and REED SMALL TOOL WORKS
Knurls - Thread Rolling Dies and Machines
WORCESTER 2, MASSACHUSETTS, U. S. A.

How TO OVERCOME SPINDLE MISALIGNMENT!

—and Simplify Tapping and Reaming

The easiest way of overcoming misalignment between the spindle and the work, in tapping and reaming, is to use a tool holder so designed that it compensates for such inaccuracies, even though they amount to as much as 1/32 of an inch radius.

That is what the Ziegler Tool Holder does! And because it does it automatically, it greatly simplifies tapping and reaming, reducing spoilage losses from oversize and bell-mouthed holes, and also reducing set-up time. Try it and see how it will increase your production rate and at the same time enable you to turn out work that meets the highest standards of precision.

Made To Fit Any Machine

Furnished with male or female taper, straight, threaded or special shanks to fit any machine used for tapping or reaming.

WRITE FOR CATALOG

W. M. Ziegler Tool Co.
1930 Twelfth St.
Detroit 16, Mich.

Ziegler ROLLER DRIVE FLOATING HOLDER for Taps and Reamers...

. . . the *Original* Saws with the
CURVED-GULLET TEETH
that permit Faster Speeds
and Feeds . . . Deeper Cuts

SIMONDS

Inserted-Tooth METAL-CUTTING Saws

Curved-gullet design . . . together with alternating square and bevel teeth . . . prevents welding of chips to the saw-plate. Each tooth is held in place by its own separate wedge, which gives extra strength to the saw. And Simonds' own special high-speed steel gives greater speed, feed, and depth of cut. So for uninterrupted operation, get Simonds I. T. Metal Saws from your Industrial Supply Distributor, or from the nearest Simonds office.

SIMONDS
SAW AND STEEL CO.
FITCHBURG, MASS.
Other Divisions of SIMONDS SAW AND STEEL CO. making Quality Products for Industry

SIMONDS — Special Electric Furnace Steels
SIMONDS — Grinding Wheels and Grains
SIMONDS — Simonds Products for Canada

BRANCH OFFICES: 1350 Columbia Road, Boston 27, Mass.; 127 S. Green St., Chicago 7, Ill.; 416 W. Eighth St., Los Angeles 14, Calif.; 228 First St., San Francisco 5, Calif.; 311 S. W. First Ave., Portland 4, Ore.; 31 W. Trent Ave., Spokane 8, Washington. *Canadian Factory:* 595 St. Remi St., Montreal 30.

When you check all the angles in Truing and Dressing Operations

ACCURACY ✓
SPEED ✓
LONG TOOL LIFE ✓

You, too, will find it pays to use
J.K.SMIT DIAMOND TOOLS

JKS STANDARD TOOLS

To assure uniformly successful results, the finest in diamonds, materials and workmanship are blended into every J. K. Smit Standard Tool. And you can count on *exact* dimensions for every make of grinder. In ordering, state the grinder manufacturer's name and type of machine.

JKS FORM DRESSING TOOLS

Designed to dress abrasive wheels with speed in any variety of shapes required, J. K. Smit Form Dressing Tools are made with selected diamonds that permit close tolerances, high finish and long tool life. Blade and chisel tools, cone shaped, pyramid type and other dressers with formed radii and specific included angles are available.

J. K. SMIT & SONS, Inc.

157 Chambers St., New York 7, N. Y.
6400 Tireman Ave., Detroit 4, Mich.

5105

SPECIFY *Van Keuren* WIRE TYPE PLUG GAGES

Tool Steel
High Speed Steel
Chromium Plated Carboloy

Wire Type Plug Gages were originated by the Van Keuren Co. in 1925. They are now in almost universal use for gaging small holes.

Longer lasting precision and lower gage cost are assured because the entire 2" length of the gaging unit can be used. When the end becomes worn, it is ground off and a new section of the original accuracy is moved out for use. The wire unit is securely held in the handle by a split bushing and a headless set screw.

Van Keuren Wire Type Gages are made to Class B accuracy +.00005" −.00000" on the Go units and ±.000025" on the No Go units. Closer or wider tolerances can be supplied if desired.

On your next order specify VK Wire Plug Gages. VK Carboloy for long runs because of the enormous saving in gage cost. VK Carboloy for fussy jobs because of the infinitesimal gage wear and insurance that the parts will be within the specified limits. VK Tool Steel—High Speed—Precision Chromium for less exacting jobs. You will be assured of the best in accuracy, quality and delivery.

The 160-page Van Keuren Catalog No. 33 gives full information on wire type plug gages and other precision measuring equipment. It also includes simplified formulas for measuring threads, splines, gears and worms. Your copy of this valuable handbook will be sent on request.

THE *Van Keuren* CO., 174 Waltham St., Watertown, Mass.

28th YEAR

Light Wave Equipment • Light Wave Micrometers • Gauge Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Measuring Wires • Carboloy Plug Gages.

from FLAT SURFACES TO INTRICATE SHAPES

with the New **DI-ACRO BRAKE**

- ROK-LOK—sensitive material clamp for accuracy
- DOUBLE-EDGED FORMING BLADE for close reverse bends
- NEW PRECISION STOPS control angularity of bends

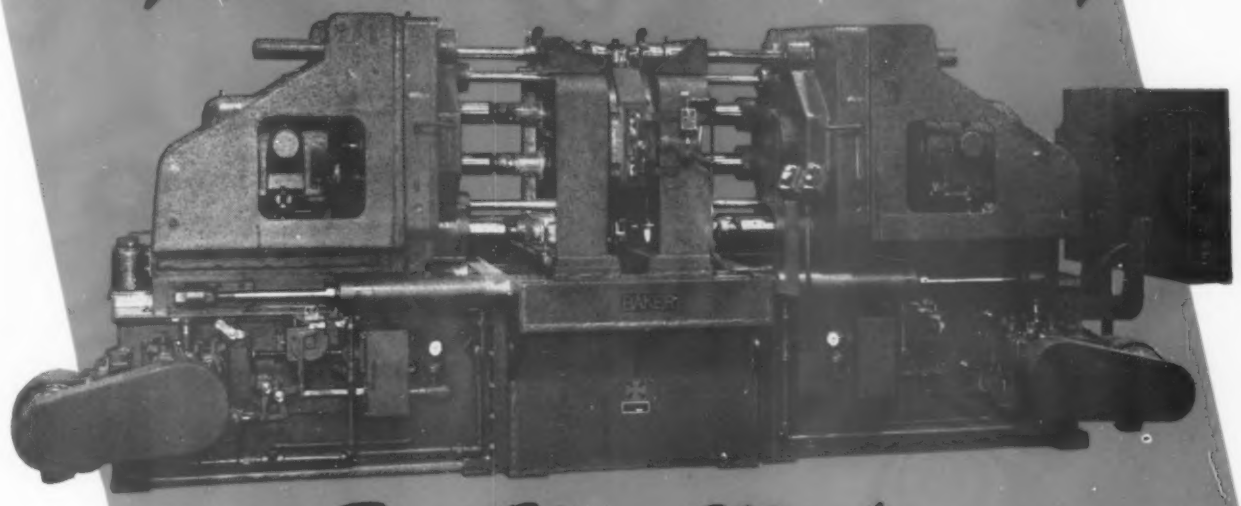
This versatile metal forming machine was developed for use in model shops, experimental laboratories and production departments where it often replaces dies for all types of precision forming operations. Di-Acro Brakes will form a great variety of materials including bronze, stainless steel, aluminum and bi-metals.

WRITE FOR CATALOG. New edition of 40-page Di-Acro Catalog contains detailed information on all Di-Acro Brakes, Shears, and Benders and illustrates how these precision machines can be used individually or cooperatively for "DIE-LESS DUPLICATING".

◀ DI-ACRO is Pronounced "Die-Ack-Ro"

DI-ACRO PRECISION MACHINES DIE-LESS DUPLICATING — O'NEIL-IRWIN MFG. CO.
375 8TH AVE., LAKE CITY, MINNESOTA

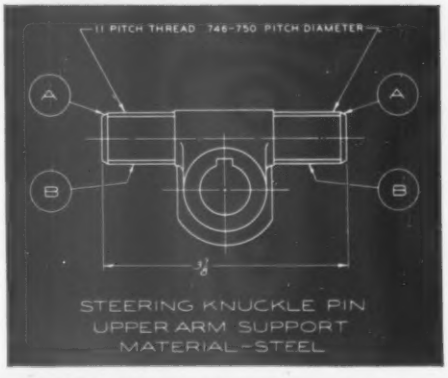
Another BAKER designed to Increase Productivity



Two Way Machine

UNUSUAL METHOD OF HANDLING TURNING AND THREADING ON HI-PRODUCTION BASIS

DIAGRAM SHOWING LOCATION OF PARTS IN THE FIXTURE



STEERING KNUCKLE PIN
UPPER ARM SUPPORT
MATERIAL—STEEL

An upswing in productivity results from this application of versatile Baker units in a Two Way Machine.

This is Model 30 HH 2-way opposed floor type unit machine for operations on steering knuckle pin, upper arm support. Each unit is furnished with a four spindle fixed center multiple head for hollow milling and chamfering, and heads provided with two additional drivers for operating lead screw spindles for external threading, using collapsible die heads.

Both heads are arranged with double motor-drive; one for the four spindles, and the second motor with reversing controls for the advance and withdrawal of the lead screw. This machine is furnished with a four station hand indexed trunnion fixture; each station arranged to accommodate two parts.

Consult with Baker engineers regarding your job problems . . . with a view to increasing your production and reducing costs.

See us at
MACHINE TOOL SHOW
Chicago—Sept. 17-26
BOOTH 639 & 681

BAKER BROTHERS, Inc. TOLEDO OHIO

DRILLING . . . TAPPING . . . KEYSEATING . . . CONTOUR GRINDING MACHINES

REPORT No. 2

...Saved $6.68 per tool with *TANTUNG!

REPORT No. 1

REPORT No. 2

TOOL ENGINEERING REPORT

DATE 1947

TOOL TRADE NAME *Tantung*

MATERIAL: Nonferrous cast alloy composed of Cobalt, Chromium, Tungsten, Carbon and Columbian/Tantalum carbides.

APPLICATION: For machining and cutting operations at far greater speeds and feeds than high speed steels.

CHARACTERISTICS: Easily ground, Tantung is a tough, shock resistant cast alloy with an extremely low co-efficient of friction and a high red hardness. Ready for use, Tantung does not require drawing or hardening before application.

TYPICAL TANTUNG PERFORMANCE

Material Machined: 416 Stainless Steel, 5/8" hex oil spray jet.

Operation: Seating in bottom of blind hole. Drill press with hand feed. 240 R.P.M.—.020 stock removal.

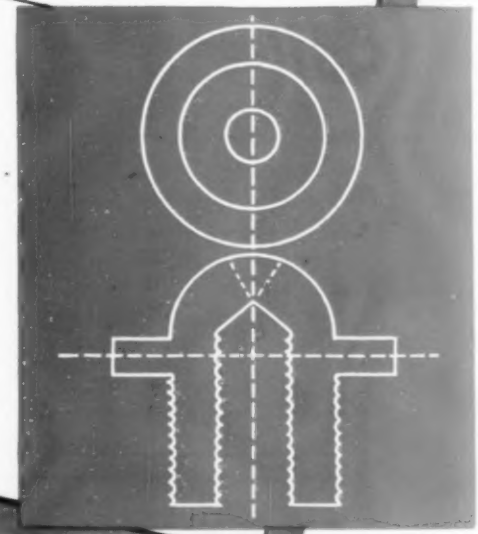
Comparative Test: Number of pieces per grind.

TANTUNG Tool 5000

High Speed Steel Tool 1000

GENERAL ENGINEERING DATA:

Manufacturer estimated labor cost to apply high speed steel tools (harden, draw and grind) was $8.00 per tool. Tantung, centerless ground tool bits cost only $1.32. High speed steel tools chipped just past the nose on the front clearance angle after a run of 300 to 400 pieces. Tantung, in constant operation, has never chipped on the front clearance angle.



Send for your copy of TANTUNG Bulletin VR-227 TODAY!

MAKERS OF WORLD'S FINEST VR Carbides

Reg U. S. Pat. Off.

VASCOLOY-RAMET CORPORATION NORTH CHICAGO ILLINOIS

District Sales and Service in Principal Cities

An affiliate of The Fansteel Metallurgical Corporation and The Vanadium Alloys Steel Company

DID YOU KNOW . . . that a large percentage of economy in carbide tool applications is wasted in converting standard tools to shop requirements. The practical solution to high tool conversion costs is V-R "CUSTOMER STANDARDS." Write or call your nearest Vascoloy-Ramet Field Engineer for full information on your "CUSTOMER STANDARD" tools.

SEND for your copy of the NEW VR-400 Carbide Tool and Blank Catalog. 32 pages of vital carbide engineering data. Address Dept. TE-247.

The amazing growth of cemented carbides in the past decade has opened the way to tremendous production increases. Vascoloy-Ramet, manufacturers of V-R Tantalum/Tungsten carbides is foremost in the development of carbides in industry. In keeping with this tradition of leading industry in carbide tool performance, V-R now takes another significant step forward by introducing V-R "CUSTOMER STANDARDS." Studies reveal that most users alter standard carbide tools before putting them to work ...an entirely unwarranted cost! BECAUSE TODAY . . . V-R "CUSTOMER STANDARD" tools, made to your design, can be used without ANY alterations, available in any grade and quantity at prices, less in fact, than it costs you to alter your present standard tools to shop specifications.

MAKERS OF WORLD'S FINEST VR Carbides

VASCOLOY-RAMET CORPORATION NORTH CHICAGO ILLINOIS. U. S. A.

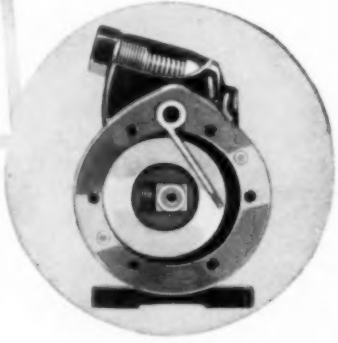
District Sales and Service in Principal Cities

AN AFFILIATE OF FANSTEEL METALLURGICAL CORPORATION AND VANADIUM ALLOYS STEEL COMPANY

For the Best in COOLANT and LUBRICATING PUMPS.. Come to Pioneer!

PIONEER
IMPELLER TYPE

Available in HORIZONTAL and VERTICAL designs, Pioneer Impeller Pumps are built for higher efficiencies, where maximum heads are required . . . conserve space for those hard to get at places . . . have long hour heavy-duty ball bearing motors for maximum life.



ROLLWAY
POSITIVE DISPLACEMENT

The Rollway, a slow speed, positive displacement pump, for liquids with lubricating properties. Available in a variety of models under three classifications—Non-reversing, Reversing and Automatic Built-in Relief Valve.

400 STANDARD MODELS TO CHOOSE FROM

Pioneer Pumps in Impeller and Rollway designs for pumping coolants, cutting fluids, abrasive liquids, lubricants and water available in every type and size. Please specify your needs when writing for information.

Pioneer Pump & Manufacturing Co.
19645 JOHN R ST. • DETROIT 3, MICHIGAN

WITH ADAPTORS YOU CAN TORQUE ANY JOB

More than 50 adaptors to fill every torquing requirement. With a JOMI torque wrench, you have the equivalent of a new precision instrument each time you make a different, instantaneous torque setting . . . and each time you use a different adaptor. The JOMI, (range to 1600 inch/pounds) and this complete line of adaptors, raise standards while speeding jobs. Adaptors include crowfoot heads, female to male adaptors, hose clamp wing nuts, screw drivers, hollow head set screws, and adjustable spanner wrenches in a complete range of sizes. Used with any standard handle.

Torquing pays because it saves
When used on hack-saws, correct tensioning eliminates creeping of blade, inaccurate cutting, and gives blade longer life. Consult your hack-saw field representative or write direct.

JO MANUFACTURING COMPANY
2442 OTIS ST., SOUTH GATE, CALIF.

"Precision tight Means it's right."

G.I.JO. (Good Intensions)

JO LINE
TORQUE WRENCHES

DRILL JIG BUSHINGS

Accurate

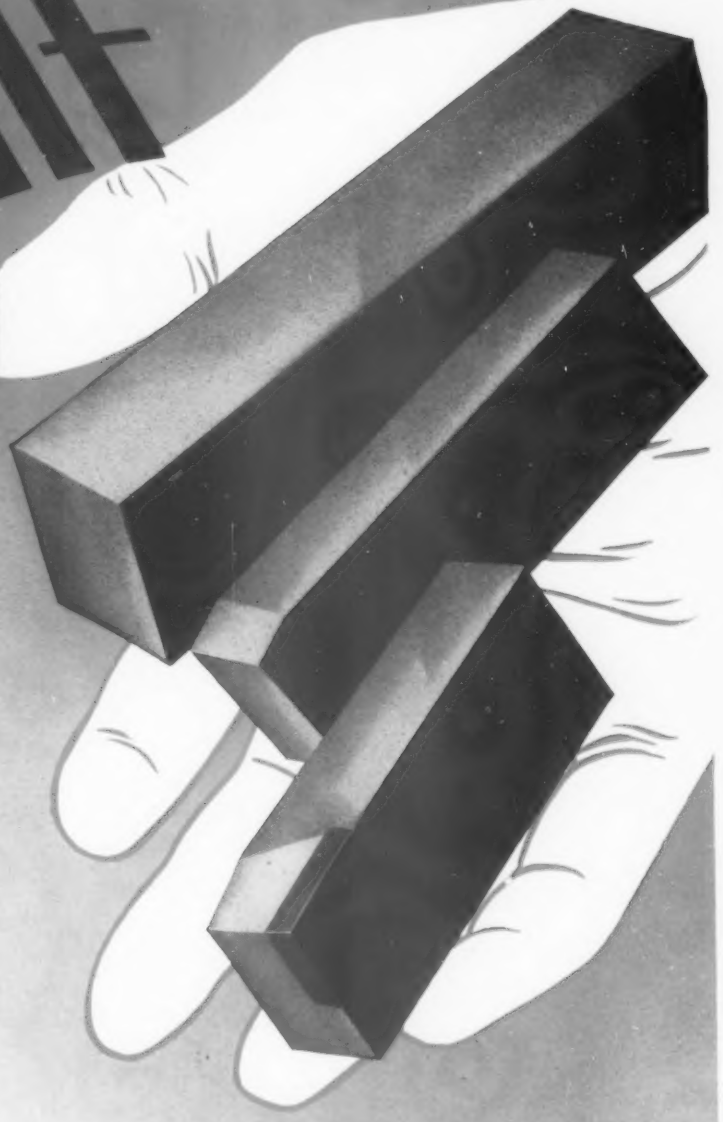
Interchangeable

Acme **I**ndustrial **C**ompany
200 N. LAFLIN ST.
CHICAGO 7, ILLINOIS

Concentric

WRITE FOR FREE CATALOG!

Crobalt Quality



Crobalt is a hard alloy (containing principally chromium, cobalt, tungsten, vanadium, zirconium and carbon), cast in the form of tool bits and inserted milling cutter blades especially developed for high speed production. At high temperatures (up to 2000 degrees) Crobalt cutting qualities remain constant.

The cutting edges of a Crobalt tool stay sharp longer, and thus assure you of much greater tool life between grinds. This automatically increases production by reducing "Down-time" ordinarily required for changing of tools. Try Crobalt in your shop.

CARBIDE TIPPED
Inserted Milling Cutter Blades

Crobalt now fabricates carbide tipped inserted milling cutter blades. Any make of tungsten carbide can be furnished. Prices for this type of blade are unusually low and the product and finish are unexcelled. We manufacture blades of all types and sizes. Send us your prints for quotation.

Crobalt Inc.

1351 N. Main St. Ann Arbor, Mich.

World's Most Versatile Metal Saw

MARVEL No. 8, Capacity 18" x 18"

There is no other sawing machine like it. The work remains stationary. The blade is guided with a 90° twist and power fed vertically through the work. The saw blade and column can be instantly swung and clamped at any angle to 45° either right or left from vertical for miter cutting.

The number 8 MARVEL saw will handle the smallest, as well as the largest work up to 18" x 18". It will cut-off, trim, miter, notch, and split all bar stock, pipe, structural sections, moulding, tubing, or irregular shapes.

Write for our catalog, containing valuable information, enabling you to select a metal saw best suited to your work.

Metal Cutting MARVEL SAWS
Better Machines—Better Blades

ARMSTRONG-BLUM MFG. CO.
"The Hack Saw People"
5700 Bloomingdale Ave. Chicago 39, U.S.A.

GAMMONS REAMERS★

Originators and Manufacturers of Helical Reamers and End Mills

Helical Taper Pin Reamers Shipped by Return Mail

The GAMMONS-HOAGLUND Company

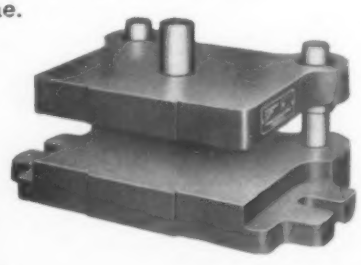
400 MAIN STREET, MANCHESTER, CONN.

"Standard" STEEL DIE SETS

INTERCHANGEABLE PARTS REDUCE DOWN TIME
KEEP PRESSES at work!

"Standard" back pin Steel Die Sets, manufactured to extremely close limits by latest methods, are proving their worth with many users who want to increase production and reduce tool maintenance costs. All parts — die shoes, punch holders, pins and bushings — are interchangeable from stock. Without rework or fitting . . . or even taking the die set off the job . . . any part can be quickly and economically replaced with minimum loss of productive machine time.

"Standard" Steel Die Sets are available in a complete range of sizes. Write for Catalog DS.



STANDARD MACHINERY CO.
1585 ELMWOOD AVE., PROVIDENCE 7, R. I.

Branch Warehouses:

CLEVELAND
The Die Supply Co.
5349 St. Clair Ave.
EXpress 1133

DETROIT
Diemaker Supplies Co.
2679 E. Grand Blvd.
TRinity 1-2865

MONTREAL
Bridge Machinery Co.
768 St. Paul St., W
LAncaster 0148

PHILADELPHIA
Fidelity Tool Supply
309 Vine St.
CAmden 4-7765

WORCESTER
Lindco, Incorporated
1023 Southbridge St.
WOrcester 6-4637

NU-SAL AND THERMO-QUENCH . . . two Park *laboratory controlled* heat-treating salts that make an unbeatable team on interrupted quenching operations!

Nu-Sal, you know, possesses unusually high thermal-conductivity. It provides rapid, uniform heating that assures consistently good results and its working range covers the hardening temperatures of most commonly used steels. In addition, you'll find that Park Nu-Sal forms an exceptionally fluid austenitizing bath of great stability and miscibility.

Thermo-Quench is a more recent Park development made especially for interrupted quenching, transformation and tempering operations. It has a low melting point . . . 305°F. . . . and it forms an extremely fluid bath that provides desirable cooling rates through the critical zone.

For specific application recommendations on these and other Park laboratory controlled heat-treating products, consult your nearest Park Service Representative or send us full particulars direct.

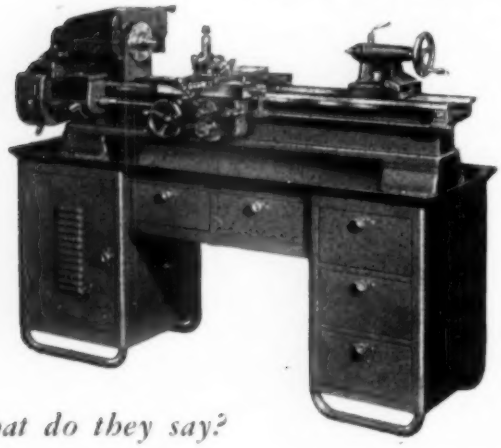
• Liquid and Solid Carburizers • Cyanide, Neutral, and High Speed Steel Salts • Coke • Lead Pot Carbon • Charcoal • No Carb • Carbon Preventer • Quenching and Tempering Oils • Drawing Salts • Metal Cleaners • Kold-Grip Polishing Wheel Cement

LICENSED MANUFACTURER: Electric Resistance Furnace Co., Ltd., Weybridge, Surrey, England

Park
CHEMICAL COMPANY
8074 Military Ave., Detroit 4, Mich.

SHELDON

TRB-S56 precision lathes



What do they say?

We asked the users why they preferred the Sheldon S-56 Lathe. They said:

"It's rugged"—The bed is heavy, the bearings large.

"Large hole in spindle"—There's a 1⅜" hole thru the spindle.

"Collet Capacity" and "Extra Capacity"—It has 1" collet capacity and 11¼" swing.

"The drive"—4-speed (8 spindle speeds) V-belt underneath motor drive, has double V-belts to the spindle that minimize power loss.

"It's really accurate, does real precision work"—Ways, lead screws, spindles, etc., are held to the very closest tolerances.

"The S-56 is big enough to handle most lathe jobs, still is low enough in price for my shop"—Only complete tooling and newly developed special machinery make it possible to build so fine a lathe at S-56 prices.

In the new TRB-S56 you get all this and in addition an even heavier headstock with "Zero Precision" tapered roller spindle bearings.

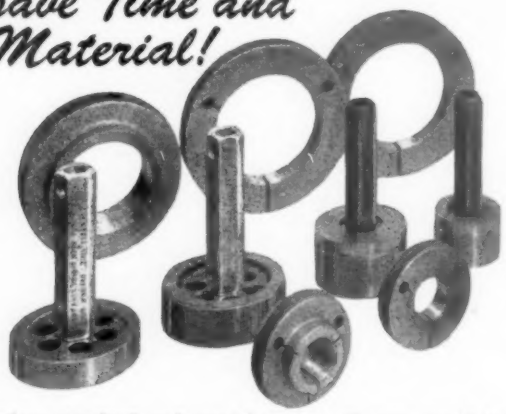
Write for circular

SHELDON MACHINE CO. Inc.

Manufacturers of Sheldon Precision Lathes • Arbor Presses • Vises
Sheldon Vernon Horizontal Milling Machines • Vertical Milling Machines and Jig Borers • Shapers
4229 N KNOX AVENUE • CHICAGO 41, ILLINOIS, U S A

GAGES STANDARD AND SPECIALIZED...

save Time and Material!



Axelson standard and special gages will save costly time and material. Close tolerances can be continually checked and maintained by the use of Axelson gages, reflecting lowered per piece cost, stepping up acceptance of finished product and profits.

Guard against loss through rejects. Use Axelson gages. Axelson stocks a complete line of N.C. and M.F. gages to meet your most urgent need.

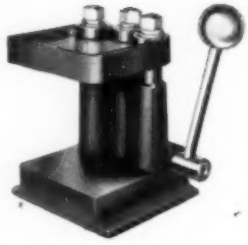
Special gages and tools quoted upon application.

AXELSON GAGES
AXELSON MANUFACTURING CO.

6160 So. Boyle Ave., (P.O. Box 98, Vernon Sta.,) Los Angeles 11, California, U. S. A.

THERE IS NO ECONOMICAL SUBSTITUTE FOR QUALITY

"CONE-LOK" JIGS



The Woodworth "CONE-LOK" jig utilizes the full braking power of its perfectly mated male and female cones.

ACCURACY YOU CAN TRUST

• MECHANICAL SIMPLICITY • ADAPTABILITY
• RUGGED CONSTRUCTION • CHIP PROTECTION
• SEALED LUBRICATION • MAXIMUM SAFETY

★ CATALOG AND FULL SCALE TEMPLATES UPON REQUEST ★

WOODWORTH
N. A. WOODWORTH CO., • SALES DIVISION
1300 E. NINE MILE ROAD • DETROIT 20, MICHIGAN

Five 7½-kw and two 15-kw Lepel Spark-gap Converters at work at Ranger Aircraft. Inset shows 9 of the 11 brazes.

Each of these assemblies, made by The Ranger Aircraft Engines Division, involves 11 brazes, 4 hardening operations and the annealing of a cyanide-hardened shaft. By use of ingenious fixtures, and careful matching of heating cycles, assembly times and machine capacity, Ranger completes 320 assemblies in an 8-hour day — with just eight operators and seven Lepel High-frequency Heating Units.

Most of the steel-to-steel brazes are handled in pairs, with heating cycles ranging from 10 to 60 seconds. Jigs and snap-closing spring clamps position the accurately cut tubing; silver-alloy rings provide the brazing metal.

Heat treating with same units provides flexibility. Where 320 brazes can be completed in less than 8 hours, converters and fixtures are changed over to annealing or hardening in a matter of minutes. The annealing is done at a rate of 240 parts per hour; hardening, with water quenching, at rates up to 333 per hour.

This installation was worked out by Ranger's production men in co-ordination with Lepel engineers. In flexibility, speed, quality and excellent working conditions, it has turned a difficult assignment into a routine production job.

SOLDERING
BRAZING
HARDENING
ANNEALING
MELTING

The same Lepel Spark-gap Converter will handle any or all of these processes, usually with advantages similar to those given in this advertisement. Often this unit will prove substantially more economical than any other high-frequency generator—*particularly when heating non-ferrous or non-magnetic materials.* Changing from one job to another can be done in less than 5 minutes.

If you have any operation — on ferrous or non-ferrous materials — which you think might be handled by high-frequency heating, let us make a quick preliminary investigation. If promising, our engineers can run tests, on samples you supply, and report just what can be done. There is no obligation; inquiries are treated with strictest confidence.

A letter to us will bring you, as you prefer, our latest catalog or a call by a representative. Any description of part or process which you can give may enable us to furnish, immediately, specific helpful data. You can help us by mentioning this advertisement.

HARDEN

SOLDER

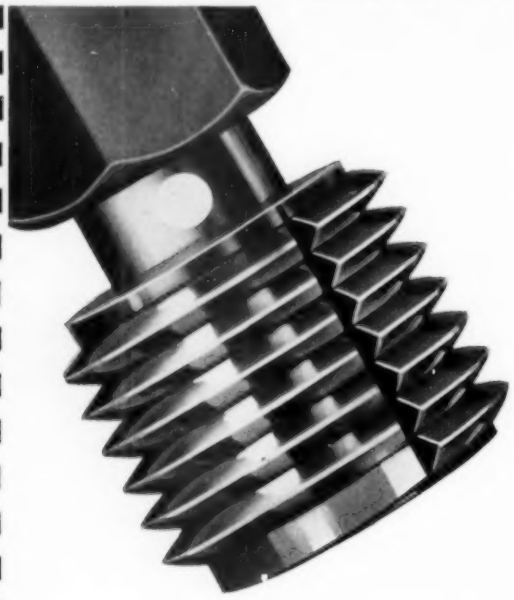
BRAZE

MELT

LEPEL HIGH FREQUENCY LABORATORIES
39 WEST 60th STREET, NEW YORK 23, N. Y.

Lepel
HIGH-FREQUENCY HEATING UNITS

That Unseen Extra Quality



"Convolution"

. . . is a process of grinding back the incomplete threads at the ends of the gage, so that the threads will start with a thread which has a full form profile.

The care given this detail in the manufacturing of Republic's thread plug and thread ring gages, eliminates thick end threads, allowing the customer the full working tolerance of the gage and permits the accurate setting of ring gages.

May we serve you?

RELY ON REPUBLIC

REPUBLIC GAGE

DETROIT 21, MICHIGAN

Is HEAVY OVERHEAD Increasing the COST of your FINISHED PRODUCT?

LET us help you reduce your finished product costs.

BECAUSE our shop is exceptionally well equipped and manned we can give you rapid precision production at an economical cost.

ANDERSONS, INC., is now machining production parts for manufacturers of farm equipment, aircraft components, communication and automotive equipment, machine tools, and food machinery. Send us your inquiries on production machining. They will receive prompt, efficient service.

MANUFACTURING FACILITIES INCLUDE THE FOLLOWING MACHINES AVAILABLE FOR PRODUCTION:

GRINDING—Blanchard Grinders; Horizontal Surface Grinders; Internal Grinders; Cylindrical Grinders; Centerless Grinders; Tool Grinders.

MACHINING—Engine Lathes; Shaper; Doall Band Saw; Drill Presses; Tapping Machines; Bench Lathes; Turret Lathes; Hand and Universal Milling Machines; Rockwell Testing and Precision Measuring Equipment.

Andersons, Inc.

2325 NELSON ST., CHICAGO 18, ILL.

Get Your Copy

OF THIS *New* BULLETIN

On "SAFETY" *Marking Tools*

FOR ALL INDUSTRIAL PURPOSES

You need this *New Bulletin*—if you use or buy marking tools. All types of "Safety" steel stamps and dies are illustrated and described—for every marking purpose. Enables you to choose the *correct* tool for your marking application. Write today—we will gladly send the number of copies you desire.

M.E. CUNNINGHAM CO.
SAFETY STEEL STAMPS

169E. Carson Street Pittsburgh 19, Pa.

always RIGHT in the groove FOR PRECISION RECESSING, GROOVING, UNDERCUTTING AND FACING

PRICES SHARPLY REDUCED

ON IMPROVED

SCULLY-JONES

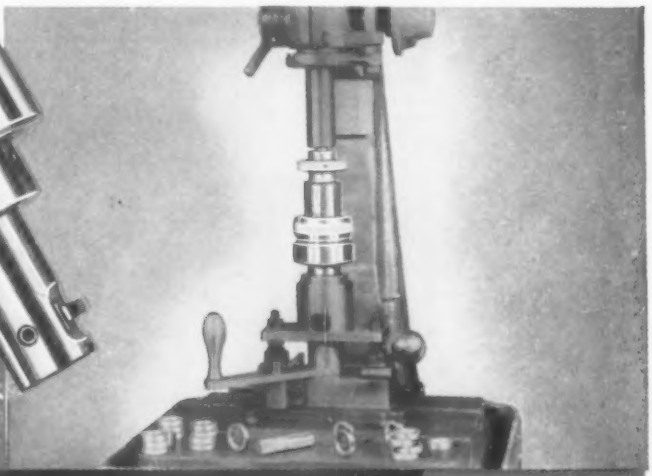
STANDARD AUTOMATIC RECESSING TOOLS

New engineering developments and improved manufacturing facilities enable Scully-Jones, Pioneer in recessing tools, to offer Lower Prices and Prompt Delivery on improved Standard Automatic Recessing Tools.

These recessing tools are piloted in Standard Bushings but, if desired, can be used with Special Stop Collars to permit use without bushings.

Interchangeable tool bit holders and cutter make these recessing tools adaptable to a majority of operations for making reliefs in tapping, threading, grinding and honing operations; for cutting snap-ring grooves, oil labyrinths, chamfers, etc.

If you will send blue prints or describe your recessing problem, our Engineers will gladly suggest the solution.



Refer to the Scully-Jones Catalog showing over 500 types and sizes of cutting tools, collet chucks, boring equipment, centers, etc.

Scully-Jones AND COMPANY

1915 SOUTH ROCKWELL STREET, CHICAGO 8, U. S. A.

Size "C" Recessing Tool with No. 8 Cutter, for making single recess in 1" collar, operating in a drill press equipped with modified universal jig vise.

IMPORTANT DISCOUNT NOTICE

75% of our Standard Tool Prices have been reduced. Write for new discount sheet.

SIZE "J"—SIZE "C" REDUCED 50% CUTTERS EXTRA

PROMPT DELIVERY . . . WRITE FOR DETAILED LITERATURE

Fixture for line boring six holes in master rod. Part locates on two plugs and is clamped with top plate.

DESIGNERS

BUILDERS

ALL TYPES OF SHOP PRODUCTION TOOLS

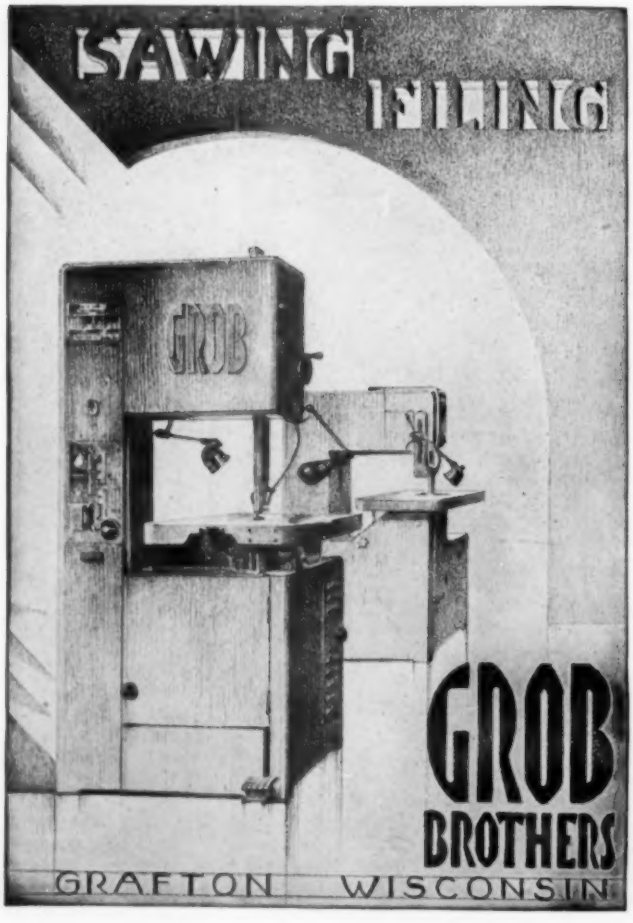
STANDARD FIXTURES AND FIXTURE LOCKS

SWARTZ TOOL PRODUCTS CO., INC.

13330 Foley **ASK FOR CATALOG 941** **Detroit 27, Michigan**

Represented by

Cleveland—J. W. Mull, Jr.
Indianapolis—J. W. Mull, Jr.
Milwaukee—Geo. M. Wolff, Inc.
Chicago—Ernie Johnson
Canada—Hi-Speed Tools, Ltd., Galt, Ont.
Houston—Engineering Sales Co.
Los Angeles—Production Tool Engineering
Boston—A. R. Shevlin Co.
Pittsburgh—J. W. Mull, Jr.
Toledo—J. W. Mull, Jr.
Philadelphia, Pa.—Morgan Tool & Equipment Co.



Columbia TOOL STEEL

SUPERDIE

High Carbon—High Chromium steel is slightly different and much better.

Its individual composition makes it a leader of its class.

COLUMBIA TOOL STEEL COMPANY

ARTHUR T. CLARAGE, PRESIDENT
MAIN OFFICE AND WORKS
520 EAST 14TH STREET • CHICAGO HEIGHTS, ILL.

UPSWING

in Speed and Accuracy

FOR MILLING JOBS!

Kent-Owens Machines "have what it takes" to get your milling jobs done *right!*

They're rapid . . . accurate . . . efficient. Designed to help you *produce more* . . . with *lower costs!* Rugged and dependable in every detail. Practical and versatile.

A wide range of hydraulic and hand operated machines are available in the Kent-Owens Standard line. Let Kent-Owens engineers recommend machines and tooling best suited to your requirements. Write for details. Kent-Owens Machine Co., Toledo, Ohio.

No. 1-14 Milling Machine
Table, 32" x 9"
Table travel, 14"

Call on

KENT-OWENS

for Milling Machines

KENT-OWENS REPRESENTATIVES

BOSTON General Machinery Corp.	HOUSTON Oliver H. Van Horn Co., Inc.	MOLINE John J. Normoyle Co.	ROCHESTER F. W. Schiefer Machinery Co.
BUFFALO Don W. Patterson	INDIANAPOLIS Oasis-Booth Machinery Co.	MONTREAL F. F. Barber Mach'y Co.	SAN FRANCISCO C. F. Bulotti Machinery Co.
CHICAGO Nell, Kohlbusch & Bissell	KANSAS CITY Eichman Machinery Co.	NEW ORLEANS Oliver H. Van Horn Co., Inc.	ST. LOUIS Blackman & Nuetzel Mach'y Co. Clarke Equipment Company
DALLAS Hamilton-Hunter Mach'y Co.	LOS ANGELES Eccles & Davies Mach'y Co.	NEW YORK Harrington-Wilson-Brown Company	SYRACUSE J. F. Owens Mach'y Company
DAYTON Gosiger Mach'y Company	MILWAUKEE Nell, Kohlbusch & Bissell	PHILADELPHIA Calco Machinery Company	TORONTO F. F. Barber Mach'y Company
DETROIT A. C. Haberkorn Mach'y Co.	MINNEAPOLIS The Satterlee Company	PITTSBURGH Barney Machinery Company	WALKERVILLE F. F. Barber Mach'y Company
GRAND RAPIDS Joseph Monahan			

AIDS TO BETTER PRODUCTION

MAGNETIC BLOCKS

For Surface Grinders

This universal set consists of two parallels 1" x 1¾" x 3¾", and two V-blocks 1¾" x 2⅜" x 1⅞". This set has been especially designed for holding various types of work that cannot be placed directly on the magnetic chuck.

NET PRICE **$17.50** SET

ADJUSTABLE ANGLE PLATES

For Machining and Grinding Angles

These Angle Plates are made of the best grade of gray iron, machined and ground true with the holes, all steel parts are hardened and ground.

MODEL "A" has four 3/16" "T" SLOTS, 3 on the face side and one "T" Slot on the top when set at 90°. The size of this plate is 3 x 3 x 3¾". Shipping weight 5 lbs.

MODEL "A"

NET PRICE . . . **$16.85**

DRILL JIG BUSHINGS

A. S. A. Standard

- SLIP RENEWABLE
- FIXED RENEWABLE
- LINERS
- HEADLESS PRESS FIT
- HEAD PRESS FIT
- HEAD TYPE LINERS

SIMPLIFIED ORDERING — Specify drill size, O. D., and length in order named. Also bushing number. Bushings above 1¾" hole size will be quoted upon request. In ordering special bushings, forward blueprint showing all dimensions and limit.

These Drill Jig Bushings are made of high grade tool steel Rockwell C 62 and 64 hardness.

*Special length bushings carried in stock in blank form.

PRECISION PRODUCTION TOOLS

PROMPT DELIVERY

Write for Literature

ACME TOOL COMPANY

96 WARREN STREET • NEW YORK 7, N. Y.

"ROCKWELL" HARDNESS TESTER

Made Only by Wilson

HARDNESS is not a *FUNDAMENTAL STANDARD*

Fundamental standards—length, mass and time—are determined by comparison with measurements set by statute. There are no such "standards" to measure hardness. But . . .

After a "ROCKWELL" Hardness Tester leaves our Standardizing Laboratory, it is perfectly capable of setting and maintaining its own standard, according to the universally accepted "ROCKWELL" Hardness scale.

Remember, the "ROCKWELL" Hardness Tester is made only by Wilson. And Wilson makes only hardness testers.

WILSON MECHANICAL INSTRUMENT CO., INC. ACCO

AN ASSOCIATE COMPANY OF AMERICAN CHAIN & CABLE COMPANY, INC.

230-H PARK AVENUE, NEW YORK 17, N. Y.

Hammond of KALAMAZOO — GOOD MACHINERY SINCE '82

SAVE TIME TOOLS WHEELS WITH

CARBIDE TOOL GRINDERS

Big grinders are "musts" for big tools. They pay for themselves in faster grinding, decreased tool damage and reduced wheel wear. They relieve tool-room bottlenecks and help speed production throughout the plant. Good management cannot afford to overlook these economies.

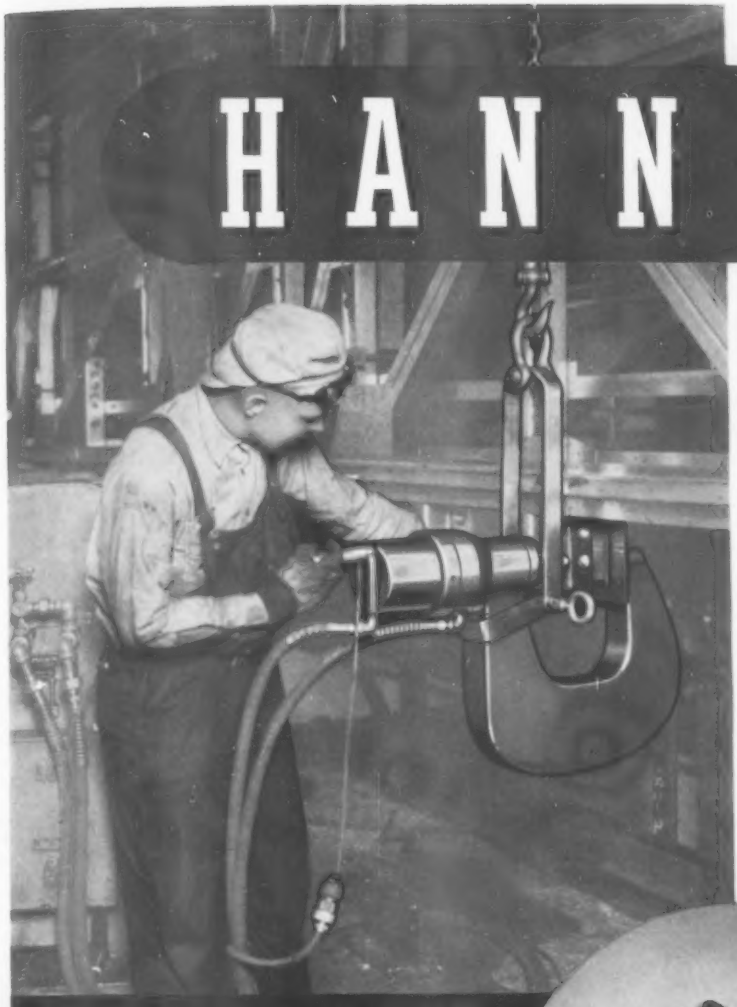
HAMMOND CARBIDE TOOL GRINDERS are made in 6" to 14" sizes for wet, dry, and Wet-or-Dry operation, and for straight, cup, chip breaker and diamond finishing grinding. All are equipped with tilting tables and necessary angle gauges. *Write for Bulletins.*

HAMMOND also makes General Purpose and Abrasive Belt Grinders • Automatic and Cylindrical Finishers • Polishing Lathes. Write for descriptive bulletins containing specifications.

Hammond Machinery Builders INC.

1661 DOUGLAS AVENUE • KALAMAZOO 54, MICHIGAN

HANNIFIN



designed and built

for BETTER, FASTER riveting

For better riveting, use Hannifin's "hydraulic squeeze" riveting action with either hot or cold rivets . . . For faster riveting, get it with Hannifin "Hy-Power" units . . . For prompt, dependable help in getting tooled-up for efficient production, take advantage of Hannifin's vast store of experience in designing and building hydraulic and pneumatic production tool equipment for all branches of Industry. Ask for recommendations — see your local Hannifin representative, or write.

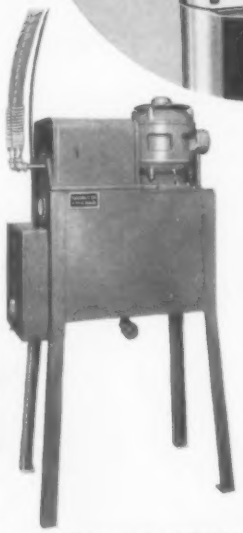
HYDRAULIC *"hy-power"* RIVETERS

push button CONTROL

FAST. Time cycle for standard riveters ranges from 1½ seconds to 3 seconds for 3" or 4" stroke units.

EFFICIENT. More work with less effort, no noise. Easy to maintain almost unbelievably high production rates. Low power costs. Every operating convenience.

COMPLETE LINE. Portable and stationary types. Standard and special designs available for riveting, pressing, punching, piercing, crimping. Dies for every purpose. Capacities to 100 tons; reach to 6' or more. Send for a copy of interesting, illustrated Bulletin No. 53-J.



HANNIFIN CORPORATION

1101 South Kilbourn Ave.,
Chicago 24, Illinois

AIR CYLINDERS • HYDRAULIC CYLINDERS • HYDRAULIC PRESSES
PNEUMATIC PRESSES • HYDRAULIC RIVETERS • AIR CONTROL VALVES

OPERATING CYCLE

A single push button* gives you complete control — thanks to Hannifin's exclusive "*HY-POWER*" Hydraulic Pressure Generator (illustrated at left). Hold button down and riveter goes through one complete cycle automatically: rapid advance stroke at low pressure . . . short power stroke at full pressure . . . automatic return to starting position. To repeat cycle, release and again depress button. For *instant safety* at any point, release button and ram retracts.

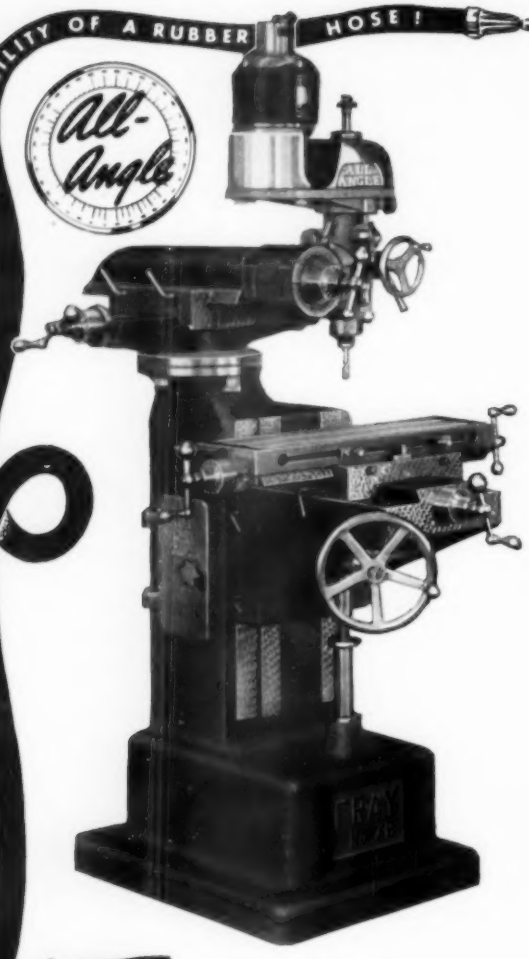
*Foot control also available.

HANNIFIN

Nationwide Sales and Service

FLEXIBILITY OF A RUBBER HOSE!

All-Angle



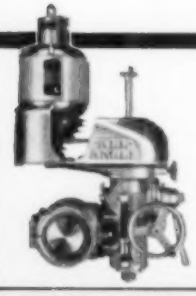
Fray

PRECISION RAM TYPE NO. 7-B

VERTICAL UNIVERSAL

MILLING MACHINE

- Flexible
- Sturdy
- Universal
- Easy to operate
- One set up
- All angles quickly obtained



- Four Sizes
- Four Types
- Adaptable to all Milling Machines

For further information write Dept. H

NATIONAL DISTRIBUTORS

H. LEACH MACHINERY CO.

387 CHARLES ST. PROVIDENCE 4, R. I.

AGENTS IN ALL PRINCIPAL CITIES

DRILL

JIG

BUSHINGS AND

GAGES

available for prompt delivery.

Write today for particulars

ECONOMY TOOL & MACHINE CO.

WEST ALLIS 14, WISC., U. S. A.

"Let your Light so Shine"

This Free Lance Writer, Planner and Editor of long experience, member of ASTE, could prepare your Manual, Catalog or Promotional Specifications and probably save you time and money—your office or mine.

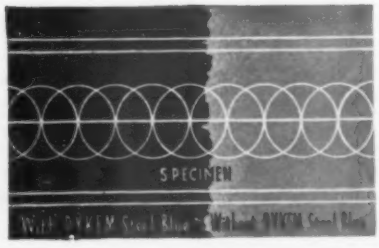
C. F. WORFOLK ALGONAC, MICH.

(Algonac is near Detroit)

DYKEM STEEL BLUE

STOPS LOSSES

making dies & templates



Simply brush on right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed layout lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

Write for full information

THE DYKEM COMPANY, 2303D North 11th St., St. Louis 6, Mo.

In Canada: 2466 Dundas St. West, Toronto, Ont.

Slash Machining Costs!

Use *Improved* TECO Cemented Carbide

for
- more pieces between grinds
- more grinds per tool
- less down time
- lower tool cost

WHEREVER you now use carbide in your shop — you've got an opportunity to make big savings, by switching to Improved TECO Cemented Carbide. Users report production increases of 3 to 10 times over former carbides used. We may be able to help you, too. It's worth investigating.

Why not make this simple comparison? Equip a machine with Improved TECO, on any carbide job. Run exactly as before. Check it against your former production figures, for pieces per grind—grinds per tool—total pieces per tool—tool cost. Then, step up speeds and feeds and note its unusual performance.

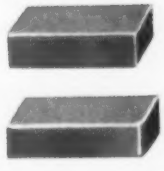
Why not arrange to demonstrate to your own satisfaction the superior performance of Improved TECO? Our tool engineers are glad to discuss your needs. If you prefer, send details of your machining problems for recommendation. Ask for latest catalog and price list.

ANOTHER TYPICAL CASE

Part machined: Piston Rings
Machine: Porter Cable Lathes
Material: Fine grain cast iron
Operation: Turning
Depth of cut: .025"
Feed: .015"
Speed: 200 rpm.
PIECES PER GRIND: 10,000–12,000 (production runs)
Best previous record: 2,500 pieces per grind
Note: Same grade TECO used for both roughing and finishing

Improved **TECO** CEMENTED CARBIDE

TECO TOOLS and BLANKS for prompt shipment
Wide range of sizes and styles for most machining needs.



TUNGSTEN ELECTRIC CORPORATION
570 39th STREET, UNION CITY, N. J.
Branch Office: 403 Western Reserve Bldg., Cleveland 13, Ohio
Representatives: Indianapolis, Ind., Detroit, Mich.

Index of Tool Engineer Advertisers

June 1947

A

Ace Drill Corporation 99
Witte & Burden
Acme Industrial Company 120
Edward C. Kennedy
Acme Tool Company 130
Lipsett Advertising Agency
Allegheny Ludlum Steel Corp. 111
Walker & Downing
B. C. Ames Company 112
Henry A. Loudon—Advertising
Andersons, Inc. 126
C. W. Munger
Armstrong-Blum Mfg. Co. 122
Ross Llewellyn, Inc.
Axelson Manufacturing Co. 124
The McCarty Company

B

Baird Machine Company 108
Baker Brothers, Inc. 117
Beeson-Faller-Reichert, Inc.
Bay State Abrasive Products Co. 91
Howard-Wesson Co.
Bellows Company 77
Ralph Gross, Advertising
Chas. H. Besly & Co. 113
Evans Associates Co.
Bethlehem Steel Company 94
Jones & Brakeley, Inc.
Brown & Sharpe Mfg. Co. 69
Horton-Noyes Company
Bullard Company 83
James Thomas Chirurg Co.

C

Carborundum Company 15
Comstock, Duffes & Co.
Casco Products Corp. 110
Grey Advertising Agency, Inc.
Cincinnati Planer Co. 14
The Bohnett Company
Cincinnati Shaper Co. 96
The Bohnett Company
Cleveland Twist Drill Co. 82
Belden and Hickox
Columbia Tool Steel Co. 128
R. J. Skala Co.
Crobalt, Inc. 121
Charles Schweim Co.
M. E. Cunningham Co. 126
Walker & Downing
Cushman Chuck Co. 90
Edward W. Robotham & Co.

D

Danly Machine Specialties, Inc. 94
Behel and Waldie and Briggs, Inc.
Darwin & Milner, Inc. 98
Brad-Wright-Smith Advertising, Inc.
Detroit Broach Company 106
Charles M. Gray & Associates
Detroit Reamer & Tool Co. 76
Dudgeon, Taylor & Bruske, Inc.
Detroit Stamping Company 98
Charles Schweim Co.
Detroit Tap & Tool Co. 92
Denham & Company
DoALL Company 75
Weston-Barnett, Inc.
Dykem Company 132

E

Eclipse Counterbore Co. 78
A. R. Gloster
Economy Tool & Machine Co. 132
Edlund Machinery Co., Inc. 100
Taylor Ward, Inc.
Elgin National Watch Co. 108
J. Walter Thompson Co.
Ex-Cell-O Corporation 135
Holden-Clifford-Flint, Inc.

F

Federal Products Corp. 89
Williams & Saylor, Inc.
Firth-Sterling Steel & Carbide Corp. 7
Ketchum, MacLeod & Grove, Inc.
Fray Machine Tool Co. 132
Joseph Maxfield Company

G

Gairing Tool Company 9
A. Hemsing Advertising
Gallmeyer & Livingston Co. 112
Wesley Aves & Associates
Gammons-Hoaglund Company 122
Giern & Anholtt Tool Co. 102
Charles Schweim Co.
Gisholt Machine Company 87
The Buchen Company
Grob Brothers 128

H

Hammond Machinery Builders, Inc. 130
Crescent Advertising Service
Hannifin Corporation 131
Armstrong Advertising Agency
Hardinge Brothers, Inc. 3
Taylor Ward, Inc.
Haynes Stellite Company 8
Unit of Union Carbide & Carbon Corp.
J. M. Mathes, Inc.
Heald Machine Co. 88
Rickard & Company, Inc.
Holo-Krome Screw Corp. 136
R. H. Young & Associates

I

Illinois Tool Works 85
Behel and Waldie and Briggs, Inc.

J

Charles L. Jarvis Co. 12
Hugh H. Graham & Associates
Jo Manufacturing Co. 120
Lockwood-Shackelford Advertising Agency

K

Kent-Owens Machine Co. 129
Beeson-Faller-Reichert, Inc.

L

Langelier Manufacturing Co. 112
Latrobe Electric Steel Co. 105
Advertising Agency of Wm. Cohen
H. Leach Machinery Co. 132
Joseph Maxfield Company
R. K. LeBlond Machine Tool Co. ..... Back Cover
Perry-Brown, Inc.
Lepel High Frequency Laboratories, Inc. 125
G. M. Basford Co.
Lipe-Rollway Corporation 84
Barlow Advertising Agency, Inc.
Logan Engineering Co. 103
Raymond C. Hudson & Associates
Lovejoy Tool Company, Inc. 104
Henry A. Loudon—Advertising

M

Jas. H. Matthews & Co. 98
Cabot & Coffman, Inc.
Michigan Broach Co. 86
Burke Bartlett Co.
Micromatic Hone Corp. 93
Marvin Hahn Advertising
Monarch Machine Tool Co. 81
Fuller & Smith & Ross, Inc.
Morse Twist Drill & Machine Co. ..... 10 & 11
Sutherland-Abbott

N

National Broach & Machine Co. 109
Witte & Burden
National Machine Tool Builders' Ass'n. 101
Fuller & Smith & Ross, Inc.
National Machine Tool Co. 102
Western Advertising Agency
Nelco Tool Company 110
Moss & Arnold Co.
New Britain Machine Co. ..... Inside Back Cover
Wilson, Haight & Welch, Inc.
Niagara Machine & Tool Works 6
Horace A. Laney, Advertising
Norton Company 72
John W. Odlin Co., Inc.

O

O'Neil-Irwin Mfg. Co. 116
Foulke Agency

P

Park Chemical Company 123
Marvin Hahn Advertising
Pioneer Pump & Mfg. Co. 120
St. Claire Advertising Agency
Pope Machinery Corp. 97
Walter B. Snow & Staff, Inc.
Potter & Johnston Machine Co. 95
Pratt & Whitney ..... Inside Front Cover
Wm. B. Remington, Inc.

Q

Q-C Engineering Products 70
Dudgeon, Taylor & Bruske, Inc.

R

Reed Rolled Thread Die Co. 114
Lewis Advertising Agency
Republic Gage Company 126
Burke Bartlett Co.

S

Screw Machine Tool Co. 73
St. Claire Advertising Agency
Scully-Jones and Company 127
Van Auken & Ragland
Sheldon Machine Tool Co., Inc. 124
Ross Llewellyn, Inc.
Siewek Tool Company 74
Evans Associates Co.
Simonds Saw & Steel Co. 115
Sutherland-Abbott
J. K. Smit & Sons, Inc. 116
Doyle, Kitchen & McCormick, Inc.
Standard Machinery Co. 122
Hammond-Goff Co.
L. S. Starrett Co. 5
Walter B. Snow & Staff, Inc.
Stokerunit Corporation 80
Super Tool Company 13
Wolfe-Jickling-Dow & Conkey, Inc.
Swartz Tool Products Co., Inc. 128

T

Tungsten Electric Corp. 133
Thoma & Gill

U

Universal Engineering Co. 71
Seemann & Peters, Inc.

V

VanKeuren Company 116
Vascoloy-Ramet Corp. ..... 118 & 119
Industrial Advertising Associates
Vickers, Inc. 79
Witte & Burden

W

Wales-Strippit Corp. 107
Horace A. Laney, Advertising
Wendt-Sonis Co. 102
L. W. Ramsey Advertising Agency
S. B. Whistler & Sons, Inc. 16
Comstock, Duffes & Co.
Wilson Mechanical Instrument Co. 130
Reincke, Meyer & Finn, Inc.
N. A. Woodworth & Co. ..... 114 & 124
A. R. Gloster
C. F. Worfolk 132
Wm. Wrigley Jr. Company 110
Ruthrauff & Ryan, Inc.

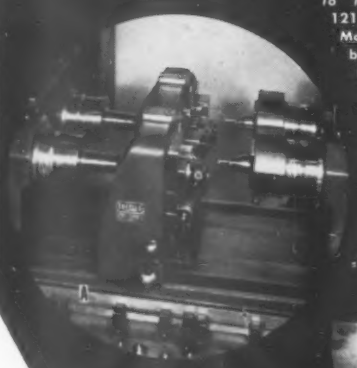
Z

W. M. Ziegler Tool Co. 114
Dudgeon, Taylor & Bruske, Inc.

YOU GET ALL 3

with EX-CELL-O *Standard* Precision Boring Machines

For instance: Two connecting rods per minute are rough bored, grooved and chamfered on the standard Ex-Cell-O 1212-A Precision Boring Machine illustrated in circle A to the left. After these operations the rods go on an Ex-Cell-O Style 2112-A Single End Precision Boring Machine for finish boring both holes. Circle B is a close-up view of the tooling on this machine. These methods of machining connecting rods are examples of good production with *comparatively simple tooling* on standard machines. When extremely high production is required, as with automotive connecting rods, larger Ex-Cell-O machines carrying more spindles are used, and parts are hydraulically located and clamped. On the other hand, when production requirements are lower, methods can be further simplified and tooling costs held to a minimum. *If you have a machining problem where accuracy, production and economy are essential, get in touch with* EX-CELL-O.



To left: Ex-Cell-O Style 1212-A Precision Boring Machine equipped to rough bore the large hole, chamfer one edge; cut an oil groove and chamfer both edges of the small hole in aluminum connecting rod. Production is 120 pieces p.h.

To right in circle: Finish boring both holes of connecting rods on Ex-Cell-O Style 2112-A Precision Boring Machine. Production with this simple set-up is 137 pieces p.h.

To right: Standard Ex-Cell-O Style 1212-A Precision Boring Machine is a flexible machine tool for accurate boring, turning, facing and similar work at production rates that keep unit costs down. For specifications write for Bulletin No. 31101.

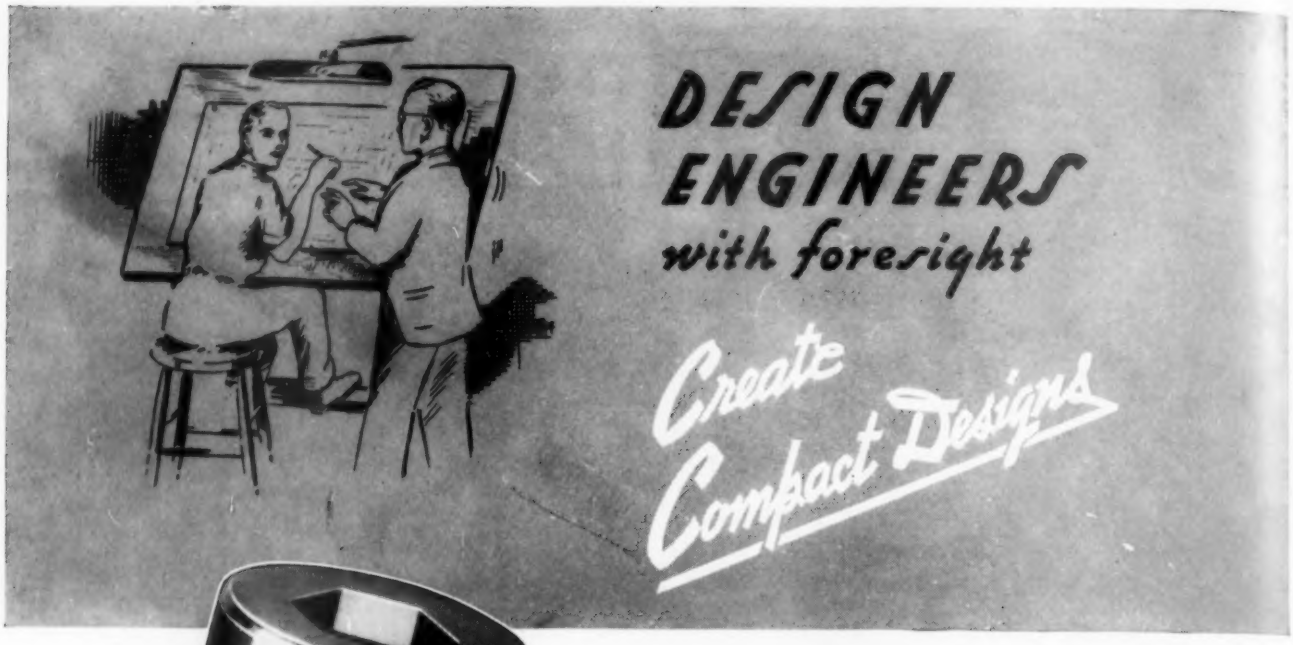
Modern machine tools mean "*more goods for more people at lower prices*" . . . see 1947 Machine Tool Show in Chicago in September

XLO
EX-CELL-O for PRECISION

47—4

EX-CELL-O CORPORATION DETROIT 6 MICHIGAN

MANUFACTURERS OF PRECISION MACHINE TOOLS AND CUTTING TOOLS • PRODUCTION PARTS AND SUB-ASSEMBLIES



DESIGN ENGINEERS with foresight

Create Compact Designs

HOLO-KROME

fibro forged

INTERNAL WRENCHING **SOCKET SCREWS**

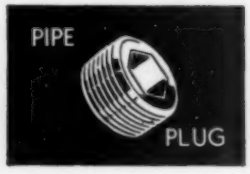
The Internal Wrenching feature permits the saving of Weight - size of members reduced. . . Saving of Space - minimum clearance for internal wrenching plus fastening placed at desired location. . . . Saving of Assembly Time - quick and positive tightening increases speed of assembly.

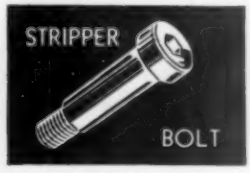
Holo-Krome Socket Screw Products are scientifically heat treated to develop, in their correct proportion, the various physical properties inherent in the special analysis alloy steel used in the manufacture of Holo-Krome FIBRO FORGED Screws - the Completely Cold Forged Screws.

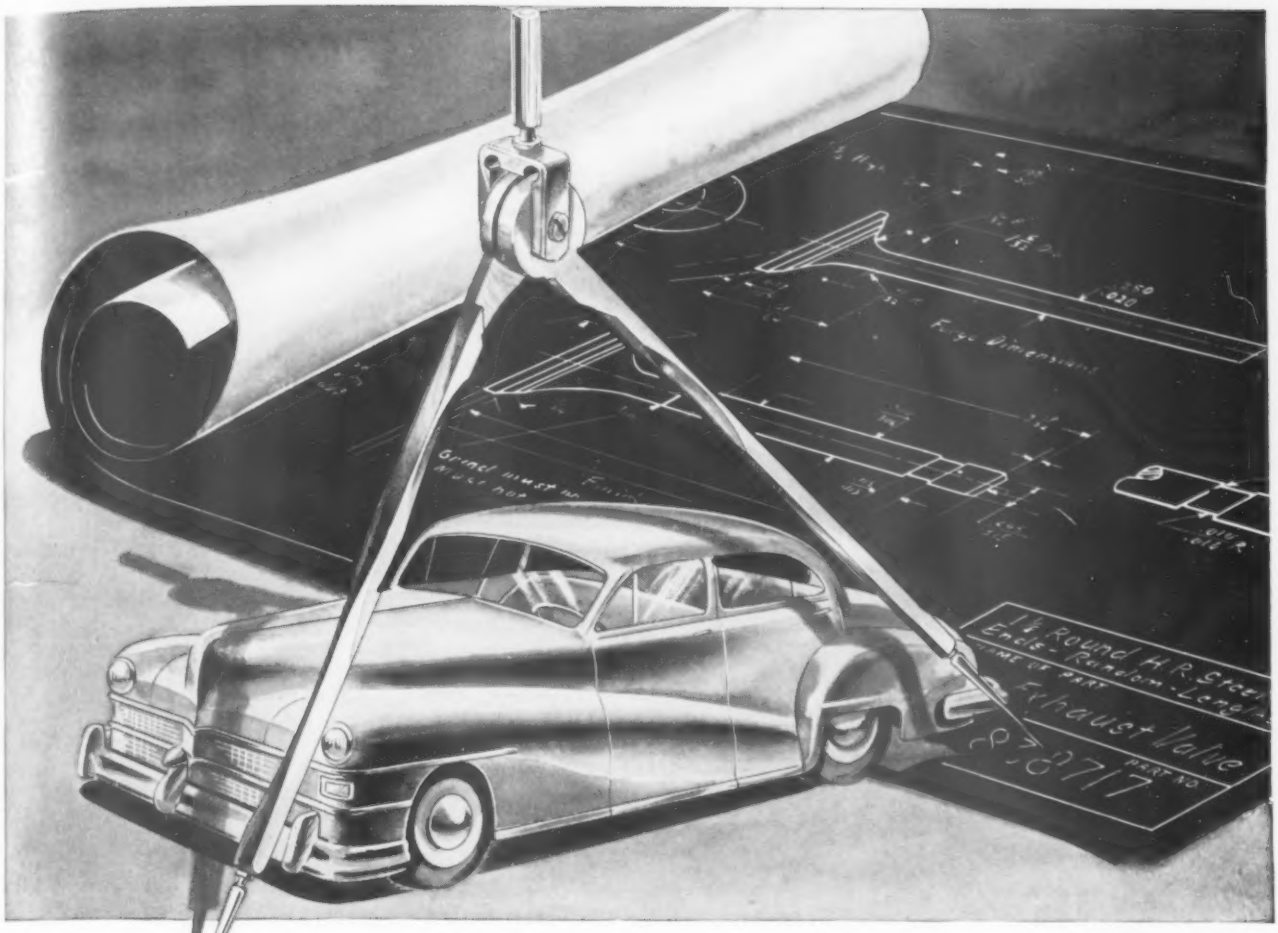
Your Holo-Krome Industrial Distributor is ready to serve you from his warehouse stock.

outstanding Unfailing PERFORMANCE

THE HOLO-KROME SCREW CORP. HARTFORD 10, CONN., U. S. A.







ALL THE GOOD NEWS COMES FROM PRODUCTION EFFICIENCY

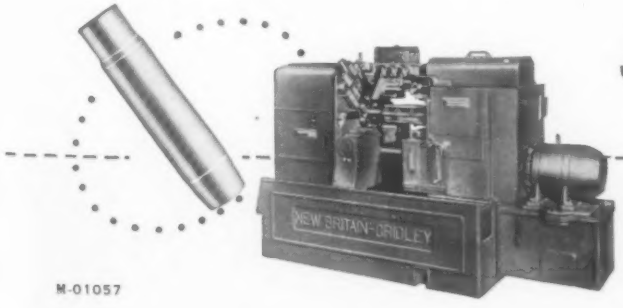
PAYING for higher wages and maintaining profits by raising prices is a sure formula for stagnation.

Lowering prices at the expense of wages or earnings on investors' savings produces the identical result.

Lower *costs*, resulting from *greater manufacturing efficiency*, is the answer. Here is something management and labor agree on wholeheartedly. But you don't *get* it by agreeing about it.

Engineers, by designing new automatic machines, new tools, and new set-up methods, have offered the key to solving the problem. It's up to management to make these better machines and methods available. It's up to the man at the machine to use that machine for all it's worth.

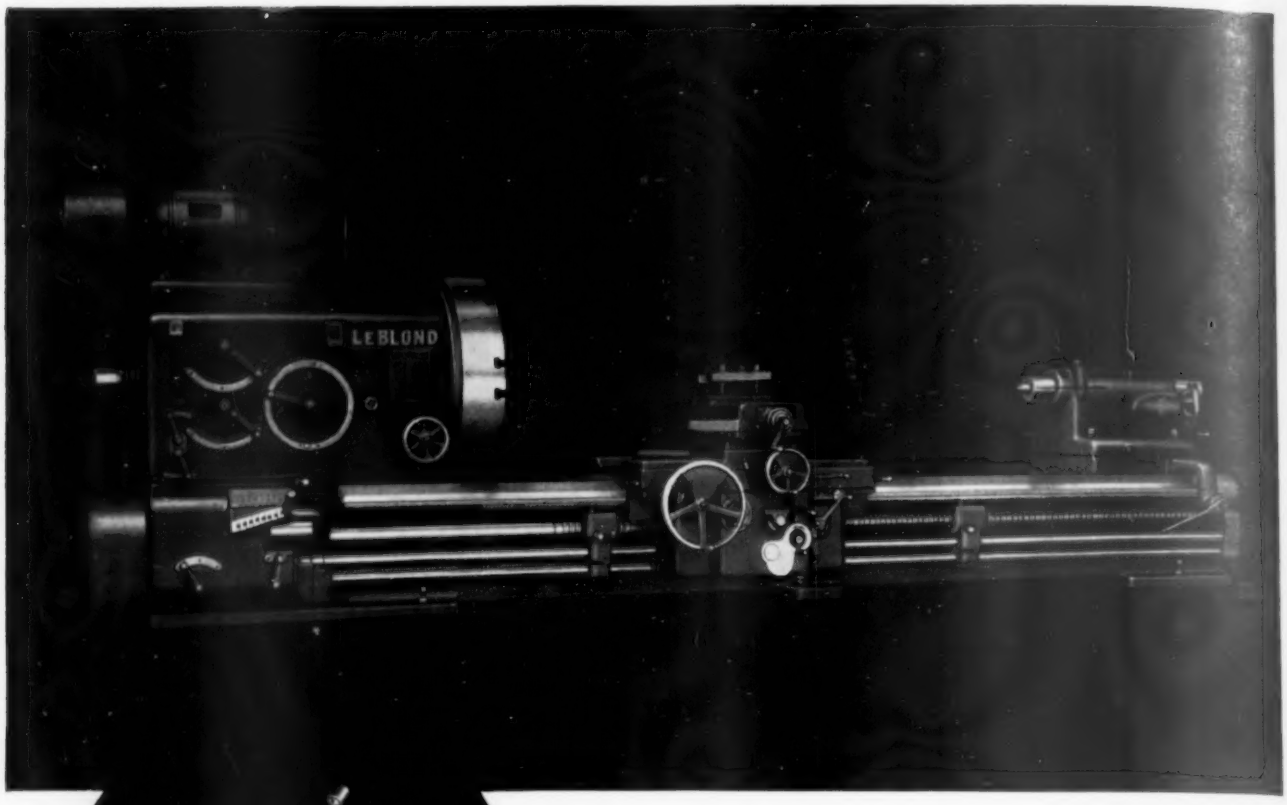
EXAMPLE: Formerly a leading automotive manufacturer found it necessary to rough grind the O.D. of this valve stem guide, machine the I.D. and then finish grind the O.D. Today the outside diameter is finish ground before being magazine fed into a Model 60 New Britain screw machine, which turns out over 406 pieces per hour with concentricity between inside and outside diameters well within the required .002 total indicator reading. Here is a sound saving, which, repeated in thousands of thousands of parts makes an important contribution to lowered costs.



M-01057

New Britain
Automatics

THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN-GRIDLEY MACHINE DIVISION
NEW BRITAIN, CONNECTICUT



Giants for Work...

THE 40" AND 50" LEBLOND HEAVY DUTY ENGINE LATHES

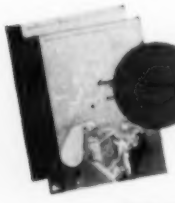
40"-50" STANDARD FEATURES

- Feed box totally enclosed, lubricated automatically.
- 27-speed geared headstock.
- Periphery-driven face plate . . . 18 speeds.
- Flame hardened steel bed ways.
- Power rapid traverse moves carriage electrically.
- Power angular feed to compound rest.
- One-piece apron with positive jaw feed clutch, lubricated automatically.
- Apron electric control starts, stops, and reverses spindle.
- Thrust lock tailstock with worm and rack construction.

Big lathes for big jobs. Gigantic in size, yet these powerful lathes are extremely easy to operate . . . produce the accuracy associated with much smaller LeBlond lathes. They present the capacity, power, and stability necessary for turning work of huge proportions. Smartly engineered, ruggedly constructed, they will hold their dependable accuracy for years. Send for complete information today.

THE R. K. LEBLOND MACHINE TOOL COMPANY, CINCINNATI 8, OHIO
LARGEST MANUFACTURER OF A COMPLETE LINE OF LATHES

New York 6, Singer Bldg., 149 Broadway, COrtlandt 7-6621-2-3.
Chicago 6, 20 N. Wacker Drive, STA 5561.
Philadelphia 40, 3701 N. Broad St., SAgamore 2-5900



Get your copies

of new illustrated bulletins describing the 40" and 50" LeBlond Heavy Duty Engine Lathes. Write Dept. HD-462

FOR THE VERY LATEST in modern lathes, be sure to see our complete line in action at the MACHINE TOOL SHOW, DODGE CHICAGO PLANT, September 17-26. You're always welcome at the LeBlond booth—conveniently located close to the main entrance.

© 1947, LEBlond

LEBLOND